TWELFTH

BIENNIAL REPORT

—OF THE—

State Board of Health

—OF—

MARYLAND.

—FOR THE—

Two Years Ending December 31st, 1897.

BALTIMORE, MD.

KING BROS., STATE PRINTERS.

1898.

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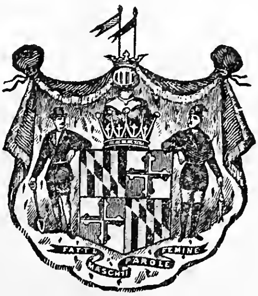

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STATE BOARD OF HEALTH, 1896 and 1867,

Dr. Jas. M. H. Bateman, Easton, Term Expires January, 1898.
Dr. John Morris, Baltimore, " " " 1898.
Dr. S. Chase de Krafft, Cambridge, " " " 1900.
Mr. Henry Brauns, Baltimore, Resigned January 20, 1897.
Hon. Harry M. Clabaugh, Attorney General, *Ex-Officio.*
Dr. Jas. F. McShane, Baltimore City Health Commissioner, *Ex-Officio.*
Dr. Jas. A. Steuart, Baltimore, Secretary, Resigned September 10, 1896.
Dr. John S. Fulton, Baltimore, Elected September, 17, 1896.

OFFICERS AND EMPLOYEES.

Dr. S. Chase de Krafft, President.
Dr. John S. Fulton, Secretary.
Prof. W. B. D. Penniman, Analyst.
Mr. Chas. N. Mitten, Inspector.
Dr. George H. Everhart, Inspector of Gunpowder and Lake Roland Water-sheds.

CONTENTS.

	PAGE
President's Letter	v
Secretary's Summary	vii
Quarterly Reports of Dr. Jas. A. Steuart, Secretary	1
Monthly Reports of Dr. John S. Fulton, Secretary	4–49
Report upon Vital Statistics	50
Report upon Inquiry Concerning Typhoid Fever	66
Reports from Local Boards of Health	69
Reports of Chemist upon Water Analyses	87
Reports of Chemist upon Vinegars	147
Report of Chemist upon Grape Juice	149
Reports of Chemist upon Malt Liquors	151
Summary of Reports of Dr. Geo. H. Everhart, Inspector of Gunpowder and Lake Roland Water-sheds	152
Summary of Reports of Mr. Chas. N. Mitten Inspector	154
Paper upon Illuminating Gas—By Dr. John Morris	154
Paper upon Rabies—By Dr. John Morris	161
Minutes of the Public Health Conference, February 17th and 18th, 1897, appendix	1–94
Proceedings of the Maryland Public Health Association, November, 18th and 19th, 1897, appendix	95
Index	225

THE HONORABLE LLOYD LOWNDES,

Governor of Maryland:

SIR: I have the honor to transmit the Twelfth Biennial Report of the State Board of Health. A cursory examination of our report will show how futile have been our efforts to gather vital statistics, owing to defects of the law and want of sufficient means to carry out the work. It must be apparent to your Excellency that this is a matter that requires the serious consideration of the Legislature.

The Board has made strenuous efforts against the prevalence of typhoid fever in our midst, but finds itself hampered by lack of suitable laws and want of co-operation by the local authorities. We desire further legislation to perfect a system of sanitation that may be adapted to the cities, towns and rural districts of the State.

We believe that the usefulness of the Board to the people of the State will be very materially advanced by adding to our equipment a bacteriological department, to be placed in charge of the Secretary of the Board.

We sincerely regret to announce the loss, by resignation, of Mr. Henry Brauns, who was one of the most useful and indefatigable workers in the Board.

In conclusion, we refer with pride to the large amount of important work which has been done during the last two years, notwithstanding the small means at our disposal.

Yours most respectfully,

S. CHASE DE KRAFFT, M. D.,

President of the State Board of Health of Maryland.

SECRETARY'S ABSTRACT OF THE REPORT.

To His Excellency the Hon. Lloyd Lowndes,

Governor of Maryland.

In presenting its Twelfth Biennial Report, the State Board of Health desires to direct the attention of your Excellency to the present condition of sanitary legislation in Maryland. Since 1874, the laws upon public health have steadily improved. We have more or less effective statutes upon the following subjects: local boards of health, nuisances, offensive trades, pollution of water supply, infectious diseases, notification of death from infectious disease, vaccination, practice of medicine, protection of children, inspection of food and drink, building inspection, explosives, railroad crossings, &c.

In practice, some of these laws have been found defective.

LOCAL BOARDS OF HEALTH.

Sections 9 to 14 of Article 43 of the Revised Code of 1888, invest the Boards of County Commissioners with the functions of local boards of health. No penalty is provided for neglect, and it has therefore resulted that the obligations sit very lightly upon many of the county Boards. The Commissioners of Wicomico county have this year, for the first time, organized as a Board of Health. The Commissioners of Worcester county have abandoned their health organization. Somerset county has not had a health officer in the twelve years since the Act was passed.

In some other counties the health officers receive such small pay as to practically insure incompetent administration of the sanitary laws. These defects are partly compensated by the Act of 1890, which authorizes the State Board of Health to assume control wherever local authorities are incompetent or inactive. These powers are, however, not likely to be exercised except in the presence of grave emergency. The law relating to local boards of health should be so amended as to provide for the organization and maintenance of an effective board of health in every county of the State. Local health officers should be appointed by the Governor of the State, and for a longer term than one year. A minimum salary, proportionate to population, should be fixed by statute.

POLLUTION OF WATER-SUPPLY.

The State and local boards of health should have authority, under certain restrictions, to stop the use of water-supplies known

to be dangerous to health. Many public wells in various Maryland towns, and many private wells used in the preparation of human food, are dangerously polluted. The State Board of Health can at present do no more than publish its findings, and placard such sources of water-supply.

INFECTIOUS DISEASES.

The law upon this subject provides for the notification of death from infectious disease. Prompt notification of the presence of infectious disease should be enforced by penalty upon both physicians and householders. Under the present law, the progress of infectious disease is unmarked and unopposed until fatal results occur. The great saving of life, which is effected wherever prompt notification is made and proper preventive measures practiced, is illustrated on page 78 of the appendix to this report.

VACCINATION.

Section 31 of Article 43, Code of 1888, provides that no teacher of any school shall receive any pupil who cannot produce a physician's certificate that he or she has been duly vaccinated. A very lax interpretation of these two words "duly vaccinated" is held by the medical profession and the school authorities in this State. Physicians habitually certify that persons whose arms have just been scarified are "duly vaccinated," and teachers accept such certificates.

The world is now so happily exempt from small-pox that we are neglecting the means by which alone immunity was acquired, and by which only it can be maintained.

VITAL STATISTICS.

Upon this subject Maryland needs new legislation.

Section 6 of Article 43, Code of 1888, makes the Secretary of the State Board of Health Superintendent of Vital Statistics, and appropriates two hundred dollars to cover the expenses of collecting and tabulating and publishing an annual statement of the marriages, births and deaths occurring in a population of more than one million souls. The application of so small a sum to so large a work has hitherto been most unprofitable. The same law orders that county officers shall make quarterly returns to the State Board of Health, of marriages, births and deaths. The election law requires that returns of vital statistics shall be made annually by the local health officers to the Supervisors of Elections. Outside of Baltimore city no such returns have ever been available for any of the purposes designated by law.

The registration of vital statistics first proved that certain fatal diseases are preventable, and so made sanitary legislation possible.

Throughout the history of State medicine, vital statistics have furnished an index of the effectiveness of preventive measures, and have pointed the way to sanitary reforms. The record of the Registrar-General's office in England have demonstrated in the most convincing way a saving of 4½ per cent. in the annual mortality for the past thirty years, and have shown by what large savings in certain items of disease such a result has been accomplished. In the papers of Dr. Mattfeldt, Dr. Rohe, Dr. Huntt and myself, on pages 7 to 23 of the appendix to this report, and in the remarks of Dr. Welch, on page 96 of the appendix, will be found the arguments for the passage of a vital statistics law.

The New York Assembly appropriates $8,000 for the salaries of those engaged in the registration of vital statistics for 6,000,000 people. Michigan pays $7,000 to seven clerks of vital statistics for a population of 2,000,000. Massachusetts pays $4,220 for five clerks and an editor of the vital statistics of her two and a quarter millions.

FUNERAL LAWS.

As the very foundation of any system of collecting vital statistics, a law is needed forbidding the burial of any human body before record is made of the name, age, race, sex and residence of the deceased, and of the time, place and cause of death. Such records not only aid statistical inquiry, they also give additional security to life and property, and furnish a mass of legal evidence, possessing permanent and increasing value.

Records of births and marriages are also important in their legal relations.

BACTERIOLOGICAL LABORATORY.

If the State Board of Health of Maryland is to keep abreast of the times in the care of the health of the State, it must possess a modern equipment.

In the study of food and drink and of infectious diseases, bacteriological methods are absolutely esssential to correct conclusions. In the examination of drinking water, chemistry and bacteriology so supplement each other as to make their joint verdict invariably just. In the diagnosis of infectious disease, bacteriological methods remove all doubt, and give to both, practising physicians and sanitary officers, firm ground upon which to proceed. Nothing so surely stops debate, or so promptly points the way to cure and prevention.

These methods should be placed at the service of all the physicians in the State. The bacteriological laboratory of the Baltimore City Health Department has, in the first year of its work, demonstrated a value vastly in excess of its cost.

The expense of maintaining a bacteriological laboratory would be but a little greater than the present cost of our inspection of food and drink. Its practical value to every private practitioner in the State, would place the State Board of Health in intimate relation with one thousand medical men in all parts of Maryland, who would, for their own sakes, keep the Board informed as to the nature of prevailing sickness. The beneficient effect of such a central laboratory service would in five years reach every family in the State.

REGISTRATION OF MIDWIVES.

Act of Assembly in 1894, chapter 511, requires midwives and attendants upon women in child-bed to do certain things for the prevention of blindness in infants. Under this law, four convictions have been secured within a year, two in Baltimore county, (pages 10 and 13), and two in Baltimore city, (pages 24 and 25.) These convictions have had a most salutary effect in producing prompt reports of diseased eyes in newborn babes. The crop of infants, said to be blind from birth, has been and will be by the operations of this wise law materially shortened in Baltimore city and vicinity.

The benefits of the Act do not, however, extend to other parts of the State, for the reason that midwives are not registered, and the educational influence of such a law cannot reach them. The State should certainly require a registration of all those persons who assume the responsibility of caring for helpless infants and parturient women.

PUERPERAL INFECTION.*

Child-bed fever and several other grave diseases following labor, are infectious, and are conveyed by the hands of physicians, midwives, nurses and attendants. The ordinary pus organisms are the agents of most of these puerperal diseases, and these bacteria are so widespread that chances to become infected are present in almost every lying-in chamber. Within the last twenty-five years physicians have learned that they themselves spread these diseases with their hands and instruments. They also found that ordinary cleanliness did not prevent infection, but that strict asepsis is necessary.

It has thus come about that physicians now regard the occurrence of puerperal infection in patients under their immediate care as in some measure a professional fault. These diseases have disappeared from our lying-in-hospitals, and are rare in the

*Dr. John Morris, though assenting to the recommendations, dissents from all the allegations of fact contained in this section, saying that in fifty years' experience he has never known a woman to be infected by a doctor or midwife.

private medical practice of today. Nevertheless, these same infections directly cause many deaths annually, and indirectly furnish a large portion of the surgical work of gynecoligists.

Nearly all the puerperal infection occurring in these days is caused by the manipulations of midwives. Women, who are poor, but not dependent, are the victims of this malpractice, and much could be done to save them if it were possible to impress certain truths upon the minds of midwives, and to supervise in a measure their practice. At present any one can legally engage in this important branch of medical practice. The State should at least require that persons who assume such grave responsibilities shall make public record of their names and addresses.

TYPHOID FEVER.

The results of the inquiry concerning typhoid fever are condensed into three pages, 66 to 69 of this Report, and they are especially commended to the attention of your Excellency. Typhoid fever is annually epidemic throughout the United States, and while Maryland has no more of this disease than falls to the share of neighboring States, she suffers more than those States whose local boards are most active and vigilant. From the choicest of our flocks this preventable disease takes annually a larger toll in Maryland, than yellow fever exacted from the whole country in 1897. If the State and local boards of health were organized and equipped to combat no other infection than typhoid fever, such work would in a few years demonstrate a value far in excess of the necessary appropriations. But this particular scourge has become so familiar that the citizens of Maryland listen with but little interest when told that typhoid fever is a preventable disease, and that it might, by organized effort, be reduced to but the twentieth part of its present prevalence.

EMERGENCY FUND.

The sum of one thousand dollars which your Excellency placed at our disposal in December, 1896, in order that the Board might possess means to meet sudden emergency, remains at this date almost intact, but ten dollars and thirty-six cents having been expended. (Page 22.) No occasion for use of this fund has arisen during the year, but it has, nevertheless, served a most useful purpose. Particularly during the progress of the yellow fever epidemic in the South, the State Board of Health was able to watch the possible routes of entry into this State with a more comfortable sense of preparation than it could have done without immediately available resources.

MARYLAND PUBLIC HEALTH ASSOCIATION

Section 4 of the Acts of 1880, require the Board to "organize, as far as practicable, in every city, village and legislative district of this State, local boards or advisory committees, to serve without pay, &c."

In February, 1897, a Public Health Conference was held in pursuance of these instructions. The Medical and Chirurgical Faculty of Maryland, through its Committee on General Sanitation, Dr. Edward M. Schaffer, chairman, made the success of this meeting certain by the active interest of all its members, and by placing the rooms and assembly hall of the Faculty at the disposal of the Board. From all parts of the State persons interested in public health came to the conference, and a permanent organization was effected under the name of the Maryland Public Health Association. The interest of the school authorities throughout the State was particularly invited, and their response was most encouraging.

A full account of the proceedings is printed as an appendix to to this report. This movement has attracted wide attention within and without the State. The large membership of scientific sanitarians has already given promise that the Association will soon be recognized as one of the foremost sanitary societies in America, and its proceedings will not only be read widely in Maryland, but will be in request by those interested in State Medicine everywhere. The cost of two such meetings as have been held in 1897 could not be provided for out of the small appropriations to the State Board of Health. Much of the money was contributed privately by members of the State Board of Health and of the Medical and Chirurgical Faculty. The Association will, in future, raise from membership dues enough money to pay current expenses, and will be so far independent of the State Board of Health, but it is doubtful if it can pay for the publication of its proceedings. Papers and discussions of such value should not be lost. Many of the topics receive such authoritative treatment that the State can, to her own credit, send these proceedings out as public documents.

The Association is expected soon to have one or more local chapters in every county of the State, and so the purpose of the law will in that respect be accomplished. There is no single item of the past year's work which seems to the Board more important than the organization of this Society, and we most heartily acknowledge the co-operation on the part of the President and Committee of the Medical and Chirurgical Faculty.

Very respectfully,

JOHN S. FULTON, *Secretary.*

December 31st, 1897.

SECRETARY'S REPORTS

AT REGULAR MEETING OF THE

State Board of Health.

Secretary's Report, on July 9, 1896.

Gentlemen of the State Board of Health:

Since the last quarterly meeting held April 6th, three meetings have been held, namely: May 1st, May 15th and June 4th. The first two at the City Hall, the last at the new quarters of the Health Department of Baltimore City, on N. Gay street. No formal report was made to these meetings, as the time was occupied with other matters.

I, therefore, beg leave to report for the quarter up to date.

At the meeting of May 15th, Dr. Morris laid before the board an invitation from the Secretary of the National Conference of State Boards of Health, to attend the conference at Chicago, June 10th, 11th and 12th.

Your secretary also made the same report, and stated that he had replied to the invitation, saying that it would be laid before the board, which was done, and the proposition made informally, that the State Board of Health of Maryland send as many delegates to represent them at the conference as were willing or able to attend, (at their own expense, of course.)

Although the board took no formal action on the subject, there was a general consent and desire shown that this board should be represented. At the meeting held June 4th, it was my intention to bring the matter formally before the board, but in the press of other important matters it was overlooked. Your secretary, therefore, felt called upon to act as the representation of this board, and with the approbation and consent of the president of the board, went to Chicago to represent the Maryland State Board. I fully realized that it would have been most mortifying had our board not been represented, and esteemed myself most fortunate in being present to profit by the admirable papers read before the conference, as well as the intelligent and practical discussions taken part in by the leading sanitarians of this country.

Your Secretary being specially interested in the gathering of Vital Statistics had propounded the question, (which will be

found in the programme): "How to gather the Vital Statistics of a State?" An elaborate paper on the subject was read by Dr. Baker of Lansing, Secretary of the State Board of Michigan. Dr. Baker's methods are perfect and their results remarkable. But, when the question was asked of him, how much does it cost?—his reply was, between $3000 and $4000, generally the latter. Two clerks do nothing else, and receive $1000 each per annum. The rest is spent in printing and paying so much a name for the reporting of cases of sickness and deaths with causes, etc.

Dr. Lindsley of New Haven, who also read an able paper, showing good results, stated that the average cost in his State was $3000, independent of printing; and so on, each representative, who had anything to show in the way of vital statistics, reported that money and money only would produce results worth publishing to the world, and thus demonstrating to the world the effectiveness, and the value of the work of a State Board of Health.

The question assigned on the programmes to be opened by your secretary was: "Is isolation and placarding of premises essential when typhoid fever exists in a house or neighborhood?" The ground taken by your secretary, was that as typhoid fever was only very remotely contagious to those who were specially exposed to the atmosphere of the disease, such as attendants and nurses, and not at all to those who resided as neighbors or the passing public. Quarantine and placarding were unnecessary, and therefore not to be enforced. After a full discussion of the subject, a vote was taken, and the position assumed by your secretary, was sustained by a large majority of the conference. I regretted exceedingly, that our whole board was not present to hear and take part in the discussions. For the very coming in contact with such men is an inspiration and education in sanitary matters.

Immediately upon my return I received a request from Dr. John H. Jamar, Health Officer of Cecil county, to visit Elkton, and to meet the County Commissioners of Cecil county, in their *ex officio* capacity, as the County Board of Health for Cecil county to discuss several important matters relating to the sanitary needs of Elkton and Cecil counties.

On June 23d, I went to Elkton, and had a most satisfactory meeting with the County Commissioners and their secretary, Dr. Jamar. They thanked me for my visit, and expressed themselves as very much gratified and strengthened in their efforts through the advice I was able to give on the subjects they were then interested in, including drainage, and the abatement of nuisances, which menaced the public health.

In response to a request from Dr. Hardesty, the new Health Officer for Baltimore county, I visited Arlington, Baltimore

county, on June 26th, and inspected a nuisance complained of by the residents of that place, and which Dr. Hardesty had not been able to overcome. A short correspondence with the officers of the West Arlington Company soon brought about a complete abatement of the nuisance, and all parties were pleased.

On July 1st, by appointment with Dr. Hardesty, I went before the Board of County Commissioners of Baltimore county in regard to the sanitary condition of Canton, which lies in Baltimore county. The County Commissioners informed me that a new Sanitary Officer, Dr. Janney had been appointed to take charge of the sanitary matters of that locality, and from my knowledge of the ability and activity of that gentleman, I feel sure that there will shortly be an improvement in the sanitary condition of Canton.

On July 6th, I visited, in response to a complaint, Cockeysville, Baltimore county, and found a condition of surface drainage which threatened the health and comfort of those who were subjected to the odors arising therefrom. As the matter involves the joint responsibility of the Turnpike Company, the Northern Central R. R. and private parties, it will take some little correspondence, but no serious difficulty presents.

On the 7th I visited, by appointment, the County Commissioners of Prince George County, at Marlboro, and had a most satisfactory interview with them. I gave them a half hour's talk, and pointed out to them the duties that rested upon them as a local board of health. The Health Officer, Dr. George C. Steuart, reported that the county was in a generally good condition of health, with the exception of some typhoid fever a few miles from Marlboro, and that out of one family of five, three deaths had occurred. The causes of the disease were plainly the impurity of the drinking water, and this he was endeavoring to correct as speedily as possible. I advised that a sample of this impure water be sent to Baltimore for analysis by the State Board of Health, in order to demonstrate to others who were incredulous as to the cause, (especially the attending physicians,) that this had produced the sickness in this family.

Your secretary is making appointments for visiting all the other counties of the State during the summer.

I have made an appointment to meet the Board of Health of Washington county, at Hagerstown on the 14th of this month. Dr. Simmons, the Health Officer of that county has written me, that he specially desires my presence on that occasion, as the controversy on the subject of pig-pens in Hagerstown has been under discussion for sometime past, and that a supreme effort to suppress them will be made.

I read this letter from Dr. Billingslea, Health Officer of Carroll county, accompanied with a bottle of water. I replied that as

soon as a chemist was appointed by the board, it would be attended to and reported upon. Also this letter from Dr. Owen, Health Officer of Charles county, to which I replied, that unless it could be shown that the health of the neighborhood was injuriously affected, the Health Board had no authority to act, but as to the pig-pens, that could and should be regulated.

I have received the following additional reports from Dr. Everhardt, the Sanitary Inspector, appointed by Mayor Hooper to inspect the water-sheds of the Gunpowder river supplying Loch Raven.

On June 28th took to Towson eleven petitions, which under the instructions of the State's Attorney of Baltimore county, I had prepared and presented them in person to the Judge of the Baltimore County Court. These were against eleven of the most flagrant violators of the law.

Respectfully,

James A. Steuart,
Secretary and Executive Officer.

Secretary's Report, on November 12th, 1897.

On October 16th, I visited Starr's "glue factory" near Union Stock Yards. Twenty-five horses are handled weekly. Carcasses are bought in all parts of the city, but most of the horses are killed in the place. Hides, hoofs, shoes and bones are sold. The carcasses are boiled in open kettles, and after the separation of the bones, the mash is taken out and made into a compost with acid cake. After a certain time the resultant material is bagged and sold as fertilizer.

The place is very filthy, and the rude method of rendering creates a vile nuisance. The boiling room has a wooden floor, badly out of repair, and covered with a thick crust of dried animal matter. Two carcasses were lying on the boiler-room floor, and a horse, awaiting slaughter, was hitched under a rough shed a few feet away. Behind the boiling shed was an extremely dirty well. The drainage from the place is conveyed in an open gutter to Gwynn's Falls.

On the same date, I visited the new abattoir at Claremont. This is a decent and well conducted establishment. But little odor was apparent, except in the rendering room of the hog slaughterhouse. No information was obtained as to the sewerage. The blood from the killing rooms is pumped directly to the fertilizer factory, about a quarter of a mile distant. Other offal is hauled to the same factory.

On October 28th, I visited the fertilizer factory at Claremont. Here dead animals arriving at the stock yards are worked up, together with the offal from the abattoir. The digesting is done

by steam under pressure, in closed tanks. The fat and bones are separated. The blood and soft parts are reduced to a mash, which is dried and ground. A brown powder results, which is sold as a fertilizer. All parts of the carcasses and all the refuse of the slaughterhouse are converted to some commercial use.

October 23d, mailed an expirimental letter of inquiry concerning typhoid fever to about 100 representative physicians and health officers.

October 28th, received telegram from Dr. Councell, Health Officer for Talbot county, reporting diphtheria at St. Michael's.

October 29th, I went to Easton and drove to St. Michael's with Dr. Councell. We met there Drs. R. U. Dodson and Seth, who took us to visit a number of infected houses, and with us made a sanitary survey of the town.

There were about half a dozen cases of diphtheria then present, one of which was discovered in a house situated upon one part of the High School lot. This child was running quite at liberty, its illness being so slight as to have attracted no attention. The school had been closed upon advice of the County Health Officer and local physicians.

The school pump, which was the water supply of the infected family and of several neighboring households, was dismantled.

We visited the colored school, which was in session. It was ordered closed.

The infected houses were placarded. No objection to this was made by the citizens.

An open letter to the citizens was printed in the St. Michael's Comet.

Only two deaths in the town were known to have been due to diphtheria, but a child who had left the town but a week earlier was reported to have died of diphtheria at Smyrna, Del. One death occurred after my visit. The school house was ordered disinfected, and permission has since been given to open the High School on Monday, the 9th of November, and the primary department on Monday, the 16th. It was advised that the Sunday School be closed until the 15th.

The inspections of Martin & Co. and of the Baltimore Butchers' Abbatoir will be reported upon by Mr. Mitten.

According to instructions at the last meeting, I beg to report the following balances to the credit of the Board, October 8:

Vital Statistics	$ 200 00
General Expenses	474 97
Food and Drink	1724 64
Salary	116 13

Notice has been served upon Louis Dawson, dairyman of Glyndon, to ship no more milk to Baltimore, until the Live

Stock Sanitary Board shall have certified to the health of his herd. This is the milk which was found by Dr. Stokes to contain pus, and the matter was referred to this Board by Dr. McShane. The facts have been communicated to the Live Stock Sanitary Board.

JOHN S. FULTON, *Secretary.*

The Executive Committee reported upon the adoption of necessary blanks, forms and stationery for the use of the Board.

The Executive Committee audited and ordered paid, bills to the amount of $373.72, as follows:

Salaries	$295 00
Secretary's expenses	7 62
Furniture	15 00
Glassware	7 00
Typewriter and supplies	45 50
Stationery	3 60
	$373 72

SECRETARY'S REPORT, ON DECEMBER, 7TH, 1896.

On the night of November 7, the City Health Commissioner notified your Secretary, that a case of diphtheria was reported in the house of Mrs Heinecke, at Sextonville. The Secretary went to Sextonville immediately, and found what seemed to be a mild case of diphtheria in the person of a boy of eleven years. Explicit directions as to the isolation and disinfection were given. While at Sextonville, the Secretary made numerous inquiries as to the factory of one Starr, who converts dead animals into fertilizer. The stench from his place was very offensive from the moment one stepped off the cars. The boiling is done about three times a week in open kettles, and the residents declared that the stench is very sickening, though not more so than that which comes from the Baltimore Butchers' Abbatoir, when lard is rendered. Starr's factory is at the Gwynn Fall's, end of a row of wooden houses, one of which is occupied by Mrs. Heinecke. A letter from the City Health Department, dated November 9, states that a culture taken from the throat of the Heinecke boy did not grow the diphtheria bacillus.

On November 8, I received a leter from Dr. Skilling of Lonaconing, reporting an epidemic of diphtheria. I went to Cumberland on Sunday night and thence to Lonaconing on Wednesday morning. I met the newly appointed town Health Officer, Dr. Bullock, the ex-Health Officer, Dr. Brotemarkle, the Mayor, Dr. Porter, and Drs. J. D. and W. Q. Skilling. Lonaconing is a particularly dirty town of about 5,000 inhabitants. Cattle and

hogs have the liberty of the streets, and there is no sort of sanitary inspection practiced. George's Creek runs through the town and serves as the common sewer. It is a typical mountain stream, varying in volume from season to season.

Six or seven slaughterhouses are in operation in Lonaconing, all built alike with wooden sloping platforms in the rear, to discharge blood and offal into the creek.

The volume of water is sometimes insufficient to wash this refuse away, and I was told by Dr. Twigg, formerly Health Officer of Alleghany County, that he had in winter been able to cross the creek upon a bridge of frozen entrails. I saw in Lonaconing a number of cases of diphtheria, and the body of a young man who had died of the disease the night before. I received information that typhoid fever had prevailed in Lonaconing during the summer and fall.

The water supply of Lonaconing is excellent, being drawn from a mountain reservoir some miles distant. I have addressed a letter to the Mayor and City Council of Lonaconing, urging the adoption of a code of sanitary ordinances, and I have reasons to believe that they will do so.

On November 10, I went to Hagerstown, where the State Faculty was in session. A most interesting and complete demonstration of the pathology of typhoid fever was made on Tuesday evening by Dr. Simon Flexner, and after it I was called on to speak to the faculty about typhoid fever in the State. I met Dr. T. W. Simmons, the county Health Officer, who showed me much courtesy and reported great success in his effort to prohibit the keeping of hogs in the city limits. I inspected the court-house with Dr. Simmons, and examined the changes which were being made under his advice in the arrangement of water closets.

On November 14, I was notified by the City Health Department that several cases of diphtheria were present in Brooklyn, A. A. Co. I found three cases in the Reinhardt family, all doing well except the mother. I injected 1,000 units of Parke Davis & Co's Antitoxic Serum, and gave strict directions as to isolation and personal disinfection, and left a note for the County Health Officer, Dr. Worthington, whom I had previously notified.

The attending physician, Dr. Frank, himself was ill with diphtheria.

November 19, visited Westminster, and examined the five houses of Mr. W. G. Rinehart, which were said to be in a state of nuisance. Of the five houses, three were really one building; and the two detached houses were very near. The tenants were mostly occupied with laundry work, and no drainage had been provided. There were two privies for the five families, and both were very near the houses.

The alley in front of the property was in a filthy state, and an attempt was being made to remedy the nuisance by filling the alley with broken stone.

It was quite evident that this plan would result in sending down a quantity of filthy water upon the public school lot about 100 yards away. I saw Mr. Rinehardt and advised him to construct a large cesspit and to pipe the waste water from all of the houses into it. Inspector Mitten reports that this has been done.

In company with Dr. Billingslea, health officer for Carroll county, I inspected the Court house, and found the water closet arrangements very bad.

I wrote to the County Commissioners, urging them to build an annex to contain the closets.

On the evening of November 19th, I attended, by invitation of Dr. E. M. Schaeffer, a meeting of the Committee on General Sanitation of the Medical and Chirurgical Faculty of Maryland, at the house of Dr. Osler. I was authorized to invite the State Board of Health to confer with the committee with a view to effecting a permanent organization among the local health boards of the State, and to consider such other topics as the Board of Health might suggest.

Mr. Brauns and Dr. Fulton, of the committee appointed for that purpose, visited Forest Glen on Nov. 20th. Dr. McShane was absent, attending the Pan-American Congress at the City of Mexico.

It was the intention of the committee to inspect the alleged nuisances without any assistance from interested parties, and only Dr. J. C. Maddox, Health Officer, was notified. We found, however, quite a collection of residents, who were unanimous in condemning the Haar lakes, as causes of the very prevalent malaria. The Haar lakes are two artificial ponds, created by damming two small streams. The water of the upper lake is quite stagnant, the only outflow being the seepage through an embankment which divides the lakes. The outflow from the lower lake is very slight, on this occasion not more than could be easily discharged through a two-inch pipe. The water of the lower lake was somewhat turbid, from what cause was not determined. That of the upper lake was more clear, but had a very decided odor of vegetable decay. The water of the lakes is not used for drinking, but is the source of ice supply to the owner.

About one quarter of a mile below the lakes is the school of Mr. Cassidy, and we made inquiry as to his water supply. He informed us that water for drinking purposes was hauled in barrels from a spring which was distant from any source of contamination. The laundry and bath-room supply is pumped from another spring to a tank at the top of the building, and thence distributed in pipes to the toilet, bath-rooms, kitchen and

laundry. This spring, he said was subject to flooding by the stream which issues from Haar lakes.

In the rear of Cassidy's school is a stream which flows into Rock Creek about half a mile below the school. The sewage from the school is conducted into a pit upon the bank of this stream. Mr. Richard Ray complained that the overflow from the cess-pool contaminated the stream so seriously, that his cattle would no longer drink at Rock Creek near the mouth of the stream, and that a bad effect had been produced upon the milk of his herd before the cattle ceased drinking at that point.

On the following day, November 25, inspector Mitten was sent out to obtain samples for both chemical and bacteriological examination from each of the Haar lakes, from the laundry supply at the school, and from the stream emptying into Rock creek.

The lakes at Forest Glen have been the subject of much contention. In September they were ordered by Dr. Steuart to be drained. In October, however, Dr. Steuart suspended the execution of the order until March, 1897.

On November 23d, acting upon information furnished by Dr. Hiram Woods, Jr., I went to Highlandtown and saw the blind infant of Henry and Pauline Seitz. Upon warrant issued by Justice Leyshon, on my affidavit, Mrs. Lierseman was arrested and bonded to appear on Saturday, the 27th, and answer the charge of having violated section 1 of chapter 511, Acts of 1894.

November 24, called to Powellsville, Wicomico county, to investigate an epidemic of diphtheria. Arrived in Pittsville at 11 P. M. and was entertained by Dr. G. W. Freeney. Dr. Freeney took me to Powellsville on the morning of the 25th. Powellsville is a small village of about twenty families. Three families were affected with diphtheria. On inquiry, I learned that a death from diphtheria had occurred in October, and that a public funeral had been held. The undertaker, Mr. Davis, at the request of a woman, opened the coffin and exposed the remains to the view of the congregation. Some cotton had been placed about the neck of the dead child to protect the clothing from being soiled by the discharges from the mouth and nose. The undertaker took some of the cotton, wiped the face with it and tossed it away. He wiped his hands upon his handkerchief, which he returned to his pocket, at the same time declining the offer of a chew of the minister's tobacco. Then the people filed up and viewed the remains.

The heaviest penalty of this criminally ignorant proceeding fell upon the undertaker, Mr. Davis, whose family were all ill with diphtheria, four of them dying.

No sort of quarantine or restriction was practiced. Two young men, both having diphtheritic membrane, were at liberty upon

the streets, and one of them had to be threatened with arrest before he realized the seriousness of my injunction that he should go home and remain there. At the home of another family also named Davis, I found three other cases of diphtheria, and was horrified to learn that a public school teacher, also a member of the household, was continuing his work. I had an interview with one of the County Commissioners and one of the school trustees, in which I impressed upon them the great importance of strict quarantine, isolation and disinfection. I addressed letters to the school teacher, Mr. Davis, to the County School Board, to the County Commissioners and to the Mayor and City Council of Salisbury. Out of the evidence of gross ignorance on the part of the people and utter recklessness on the part of the authorities, I made an argument which will, I trust, move the people of Wicomico county to institute radical reform in sanitary matters. The Secretary of the School Board has informed me by letter that my suggestions were put into the form of general orders and made obligatory upon the teachers throughout the county. I did not obtain the name of the minister who conducted the disastrous public funeral in October.

While at Powellsville, I examined a large partnership ditch which runs through the village. It had not been cleaned for years, and was in a stagnant condition. Notices were served upon all of the owners to clean the ditch within twenty days.

November 26th, I went to Highlandtown to attend the trial of Mrs. Pauline Lierseman for violation of the Act for Prevention of Blindness in Infants. It was established by the evidence of Mr. Vansant, of the City Health Department, that Mrs. Lierseman is a registered mid-wife, and that copies of the law had been sent her.

Mrs. Pauline Seitz testified that her baby was born on the 7th of April, under the professional care of Mrs. Lierseman; that the baby's eyes were well until the third day, when they began to discharge matter; that Mrs. Lierseman prescribed camomile tea and breast milk, and said that the affection was of a trifling nature.

Dr. Hiram Woods testified that the child was brought to the Presbyterian Hospital in July, and exhibited the hospital records to show that the child was then totally and incurably blind.

Mrs. Lierseman admitted that she had not notified the Health Department nor any medical man, and said that being unable to read English she had misunderstood the provisions of the law. Your secretary recommended her to the leniency of the justice, and she was fined $25 and costs.

The city newspapers published full accounts of the trial, and it is hoped that this conviction, the first under the law, will have a good effect upon the practice of midwives.

In obedience to the action of the board on November 12th, a letter has been addressed to the Commissioners of Cambridge, urging them to pass ordinances regulating the feeding of hogs within the corporate limits. No reply has been received.

The following letter was addressed to Governor Lowndes, concerning the Emergency Fund:

No. 10 South Street,
Baltimore, *December 1*, 1896.

To His Excellency the Honorable Lloyd Lowndes,
Governor of Maryland:

At the recent meeting of the State Board of Health, on November 11th, the secretary was instructed to respectfully request your Excellency to authorize the comptroller to issue his warrant upon the treasurer, in the sum of one thousand dollars, in favor of the State Board of Health of Maryland, to be expended under the supervision of your Excellency as need shall appear.

No part of the fixed appropriations administered by the board can be diverted to combat local outbreaks of communicable disease. Such emergencies are continually occurring, and might be more promptly, effectively and economically met, if there were funds at the immediate disposal of the board for such purpose. Rather than lose valuable time by a formal application to the chief Executive for part of the emergency fund, the board has met these contingencies instantly, but with inadequate means and inferior success.

The work of the Board of Health is, therefore, seriously hampered, and might, in the presence of a grave epidemic, be temporarily suspended for lack of funds. A board, which is ill-prepared to put down small epidemics, may be easily overwhelmed by a great one. It has befallen Maryland, at least once within recent years, to be for a time helpless when invaded by small-pox, and to be assisted by health authorities from without our State.

A commonwealth, so defenseless, is not only reckless of her own citizens, but is also a menace to her neighbors. The Board of Health of Maryland, facing such possibilities without immediately available resources, is in a state of emergency, and for the relief of such a condition, this petition is respectfully submitted.

The Act providing an emergency fund refers to "epidemic or pestilential disease," and in this connection we beg to report, that typhoid fever is annually epidemic in Maryland. The causes are perennial, and are so widely distributed that the funds at the disposal of the State Board of Health will do but little effective work against the disease. We ask you to consider whether

some part of the emergency fund may not be properly applied to this important problem.

If it shall seem wise to inquire into details before acting, I am authorized to invite your Excellency to be present at the regular monthly meeting of the board at noon, on December tenth, or to make an appointment with the Secretary at your convenience.

Yours very truly,

JOHN S. FULTON, *Secty.*

During the month, your secretary has been bonded by the Fidelity and Deposit Company, in the sum of $1,800. The annual appropriation of $200 for vital statistics has been received and deposited to the credit of the board.

During the month a list has been prepared of all the physicians in the State, by counties. The inquiry concerning typhoid fever, scarlet fever, and diphtheria, has been printed and indexed. The accompaning letters have been mimeographed, the envelopes addressed, and all the inquiries will go out in one mail.

JOHN S. FULTON, *Secretary.*

The Executive Committee audited and ordered paid, bills to the amount of $591.24, as follows:

Salaries	$295 00
Members' expenses	30 00
Secretary's expenses	19 21
Balance on Typewriter	65 00
Printing and stationery	52 90
Postage on vital statistics	37 00
Secretary's bond	10 00
Mimeographing	6 00
Bacteriologist	20 00
Inspector's expenses	37 53
Incidentals	3 60
Dues to the national conference	15 00
	$591 24

SECRETARY'S REPORT, ON JANUARY 14TH, 1897.

The most important work of your Secretary during December, was the mailing of 740 inquiries, respecting typhoid fever, diphtheria, and scarlet fever. Copies of the law, having the penalty clause printed in bold type, and books of death return blanks, were enclosed with every inquiry. Up to date, 204 replies have been received, showing the measure of the regard of the medical profession in this State for their duty as citizens. The replies have all been courteous, and many of them have expressed a generous

interest in the work of the State Board of Health. I have addressed a letter of thanks to each of the 204 gentlemen who replied. My letters were individual communications, acknowledging the distinct value of the information received, and asking a continued interest in the work of the Board. Sixty deaths were returned on the blanks sent for that purpose.

To the physicians of Alleghany and of Montgomery counties, belong the distinction of returning the most reports in proportion to the number addressed. Somerset and St. Mary's furnished two replies each. Somerset has apparently but two doctors, both retired. The reports from that county show, that in 1896, there were, in Somerset county, no cases of typhoid fever, of whom four died.

I have not yet had the time to tabulate the reports by counties, but shall do so, and shall publish them in the report to the Governor, regardless of their absurdity.

On December 17, went to Highlandtown, and with the assistance of Dr. Hiram Woods secured the conviction of Mrs. Krieger, midwife, for violation of the Act to prevent blindness in infants. Mrs. Krieger was fined $25. She had no money, and it was agreed with the Justice, Mr. Wm. Leyshon, to reduce the fine to $10. The child, that of Mrs. Loebel, had lost one eye, but the other was believed to be curable.

On the 15th of December I went to Station H, York Road, to examine a cess-pool in process of construction on the property of Mr. S. E. Eichelberger. The pool was a well dug 25 feet deep to water, was not cemented and had a gravel bottom. Took samples of water from several wells near the pool, and sent a notice to Mr. Eichelberger that we would make chemical examinations of the water surrounding his cess-pool with a view to action against him if his cess-pool should increase the pollution. All the water taken was found to be unfit for use. Several lots on the east side of York Road were found in a filthy and undrained state, and notices to abate were served on the owners.

On December 19, I went to Laurel, and with Dr. Huntt, the Health Officer, inspected the town. Laurel has a fair code of sanitary ordinances, but owing to popular indifference they are not enforced. Many nuisances exist. Mr. Mitten was sent to Laurel to report in detail, and upon his report twenty-four notices were served.

On December 28, I wrote to Mayor Phelps, of Laurel, urging the adoption and enforcement of a better sanitary code. To this no reply has been received.

I have, upon request, sent codes of sanitary regulations to the towns of Lonaconing and Salisbury. No official notification of any action has been received, but I learn from Dr. J. O. Bullock, that the Lonaconing Council will probably pass the code, and

from private sources, that the Council of Salisbury has enacted some of the ordinances proposed to them by this Board.

On Thursday, January 7th, I went with Mr. Brauns to meet the Committee of the Medical and Chirurgical Faculty to consider the plan of a conference of local health officers. Drs. Welch, McShane and myself were made a committee upon programme and invitation. I have addressed all the health officers of the State, all the County Commissioners, and several town councils, asking for delegates. Only a few have replied. So far but one Board of County Commissioners has declined to send a delegate.

Your secretary begs to call your attention to a letter written on November 20, 1896, to the County Commissioners of Carroll county. No reply has been received, nor have any steps been taken to remove the very offensive nuisances existing in the county court house. Several Boards of County Commissioners have omitted the courtesy of an official reply to communications from the State Board of Health, but the Carroll County Commissioners have added to the discourtesy, neglect to remedy the nuisance which affects all citizens who have business in the court house.

Dr. W. E. Wysham, Health Officer for Catonsville, died in December, and Dr. Chas. Mattfeldt has qualified in his place.

Dr. T. W. Simmons, of Hagerstown, has notified me of his coming retirement, but no notification of his successor has been sent to this office.

I have had some correspondence with the citizens of Forest Glen. The owner of the Haar lakes signified his willingness to drain those ponds several weeks ago, but has not yet done so. Certain new evidence has been developed by the bacteriological study of the water at Forest Glen, which renders further investigation necessary. This will be done in a few days.

His Excellancy, Governor Lowndes, has considered our application for part of the Emergency Fund, and after consultation with the Comptroller and Treasurer, has placed $1,000 at the disposal of the State Board of Health. This amount is now deposited subject to the check of the secretary.

JOHN S. FULTON, *Secretary.*

The Executive Committee audited and ordered paid, bills to the amount of $570.01, as follows:

Salaries	$295 00
Rent	75 00
Printing and strationery	114 25
Secretary's expenses	7 91
Inspector's expenses	20 54
Members' expenses	10 00
Chemist's expenses	5 15
Typewriter's supplies	5 00
Mimeographing	6 00
Bacteriologist	10 00
Antitoxin	10 36
Copying and indexing	17 20
Incidentals	2 60
	$579 01

SECRETARY'S REPORT, ON MARCH 11, 1897.

On January 11th, I received a letter from Mr. C. J. Orrick of Cumberland, inquiring about the services of a bacteriologist for the examination of the Cumberland water supply. Later correspondence shows that the City Water Commissioners have erected an experimental sand felter which is being studied by Dr. Stokes, Baltimore City Bacteriologist.

On the 18th, I received the following letter from Attorney General Clabaugh, relating to the resolution offered by Mr. Brauns:

BALTIMORE, *January 18, 1897.*

JOHN S. FULTON, M. D.,
Secretary State Board of Health,
10 South street, City.

Dear Sir: Yours of the 15th instant duly received. In response to the inquiry made therein I would say that, in my judgment, it would be against the policy of the law to permit the Board to pay any one of its members to act as inspector or as temporary agent of the Board for the purposes set out in your inquiry. Section 7 of the Act of 1880 says: "No member of the Board except its Secretary shall receive any compensation, but the additional personal expenses of any member while engaged in the duties of the Board." Whilst I do not regard this as an absolute prohibition, I nevertheless think that it would be against the tenor of the law for the Board to employ any one of its members and to pay them for any labor or performance of duties that might arise from the action of the Board.

Very truly yours,

HARRY M. CLABAUGH,
Attorney General.

On January 25th, I saw an item in the "Sun" announcing that the County Commissioners of Worcester County intended to abandon their local health organization. I wrote to Dr. Bishop, Clerk to the County Commissioners, inquiring if this were true. His reply was communicated to the State Board of Health on February 16th, and I am authorized to consult the Attorney-General and take necessary steps to prevent this action. I have since sent to the County Commissioners of Worcester County a code of ordinances which I ask you to declare in effect on and after the 1st day of May.

On January 26th, I received a letter from the Burgess and Commissioners of New Windsor, in Carroll county, submitting the proposed ordinances for the approval of the State Board of Health. These ordinances, which prohibited the slaughtering of animals within the town limits after July 1st, and the keeping of pigs after the 1st of January, 1898, have since been passed, and the Commissioners inform me in a later letter that the citizens who disapprove the ordinances will try to elect a council pledged to their repeal.

On January 29th, I transmitted to Dr. J. Pembroke Thom, the following letter received from the Secretary of the Sanitary Live Stock Board:

January, 1897.

DR. J. S. FULTON,
Secretary of the State Board of Health.
BALTIMORE, MD.

DEAR SIR:—I have been requested by Attorney-General H. M. Clabaugh, to state to you that the records of this office do not show that Dr. Thom's place was declared an infected centre by this or the old Board. I remain

Very respectfully,
C. W. MELVILLE, *Secretary.*

On February 2d, I wrote to the City Attorney for Frostburg, Mr. Clayton Purnell, and to Mr. Oder, Editor of the Morning Journal, urging them to resist the expressed intention on the part of the Mayor and some members of the Council to relinquish their sanitary organization. Mr. Purnell spoke to the Council successfully on this subject.

On February 9th, I received a request from Mayor Randolph Humphreys of Salisbury, for the examination of the City water-supply. Mr. Mitten went to Salisbury, obtained samples of the river water, of the water in the distributing mains, and at the pumping station. The chemical and bacteriological results show that, except the river water, all are good.

I have received several communications from White Haven, in Wicomico county, complaining of nuisances there. As there is no present sickness there, I have not felt called upon to take any of my own time from more important matters in order to visit White Haven. The Wicomico County Commissioners can correct these abuses at very much less cost than the State Board of Health, and if the State Board of Health must do this work in counties where the legally imposed sanitary duties of the commissioners are habitually neglected, the expense should not be borne by the State, but should be a valid claim against the county. The Wicomico County Commissioners have steadily declined to exercise any of the functions of a Local Board of Health, and I have, therefore, sent them a code of regulations to go into effect on the first day of May.

Since the 7th of January, your secretary has been almost continuously occupied in arranging for the Conference of Health Officers at the hall of the Medical and Chirurgical Faculty on February 17th and 18th.

The first day's session opened with sixty-six members present, representing all the counties of Maryland except Frederick and Garrett. The later meetings were better attended, and the proceedings were both interesting and profitable. An expert stenographer was employed to take the minutes for publication in the biennial report. As a number of requests for published proceedings have been received, the Secretary addressed a letter to Mr. Richard Dallam, Secretary of State, asking if some advanced copies could not be printed now. Mr. Dallam replies advising that we submit estimates of the cost to the Governor.

The Conference was permanently organized as the Maryland Public Health Association, and we may fairly hope that the State Board of Health has in the new organization a powerful ally. Under our statutory authority to effect sanitary organizations, your Secretary has felt justified in paying the preliminary expenses of printing and correspondence. A large part of the cost was borne by the Joint Committee of the Medical and Chirurgical Faculty and by the State Board of Health.

On Febrnary 20, I went with Prof. Penniman to inspect the Sulphate of Barium Works at Highlandtown. Much complaint is made of the sulphuretted hydrogen from that factory and of the dioxide of sulphur fumes. A suit is now pending in the Baltimore County Court. I visited the place again on the 27th, with Mr. Ensor.

On March 8, I went to Forest Glen to inspect the work done at Haar Lakes. The lakes have been drained, but not thoroughly. I have written Mr. Proctor, giving further directions as to drainage.

John S. Fulton, *Secretary.*

Extract from the Minutes of the Executive Committee, on February 16, 1897.

Dr. Fulton announced the resignation of Mr. Brauns, and that the same had been accepted by the Governor. The following resolutions were passed, and ordered to be sent to the Governor of Maryland and to Mr Brauns:

Resolved, That this Board learns with regret that Mr. Henry Brauns has resigned from membership in this Board, and that the Governor be respectfully requested to suspend his action until the Board can present to Mr. Brauns certain reasons why he should reconsider his resignation;

Resolved, That Mr. Brauns' services to this Board have been marked by fidelity and zeal, and have contributed much to the success of our work; that the loss of his services will be apparent in our future results, and that he be urged to return to membership in the State Board of Health.

The Executive Committee audited and ordered paid, bills to the amount of $931.60, as follows:

January Accounts.

Salaries	$295 00
Secretary's expenses	7 91
Members' expenses	10 00
Inspector's expenses	20 54
Rent	75 00
Chemist's expenses	5 15
Bacteriologist	10 00
Mimeographing, copying and indexing	23 20
Printing	41 25
Incidentals	7 60
	$495 65

February Accounts.

Salaries	$295 00
Secretary's expenses	17 22
Members' expenses	25 00
Inspector's expenses	62 63
Bacteriologist	15 00
Stationery	8 80
Rubber type	4 50
C. J. Dunn & Co	5 00
Incidentals	2 80
	435 95

Secretary's Report, on May 13th, 1897.

On March 17th, I went with Dr. Penniman to visit Cambridge. We inspected the water-works, which belong to a private corporation. The wells are deep artesian, the supply is abundant and of good quality. Three slaughterhouses were inspected, none of which are fit for their purposes. One had not been used for about ten days. It was such a structure as is ordinarily used for storing corn in the cob, that is, it was boarded perpendicularly with narrow strips, having interstices about an inch wide. The place had a bad odor. The blood was supposed to flow through a hole in the floor into a tub. As a matter of fact, we were told that the blood flows down the adjoining ditch-bank, and, as the house is situated on a public thoroughfare, the spectacle must be disgusting when slaughtering is going on. One slaughterhouse was fairly clean, though badly constructed, one part being used as a stable and carriage-house. The third was very dirty, the offal being left in piles upon a ditch-bank. The proprietor told us, that he did not concern himself about the entrails, which are carried off by dogs.

In the heart of the town we found a vacant lot covered by ten or twelve inches of stagnant water, and evidently used as a dumping spot for garbage.

There are six public wells on the streets in Cambridge. Samples were taken from all the public wells and from the public supply, and will be reported upon by the Chemist.

We visited also the jail. It was in a most unsanitary condition, the soil pipe in the water-closet having been stopped up. Notice has been served upon all the offenders. We had an interview with one member of the Town Council and one County Commissioner. Letters have since been sent to both the County Commissioners and the Town Council. I have since been informed by the County Commissioners of Dorchester county, that the plumbing in the jail has been completely renewed.

On March 24th, I reported to the Town Council of Crisfield, upon a sample of artesian water, which it was proposed to use as public supply. It was of a bad character. Its use for general supply was not advised.

On March 25th, I was authorized by his Excellency, Governor Lowndes, to expend not more than $250.00 upon the publication of the proceedings of the recent Health Conference. Bids were submitted and the "copy" is now in the hands of the printer.

On the first of April, I went with Mr. Charles T. Wescott and Mr. Elliott, City Solicitor, to examine the mill stream on Gwynn's Falls. This stream is an artificial sluice, nearly a mile in length, on the east bank of Gwynn's Falls. Along its banks are situated a large number of slaughterhouses, all of which apparently discharge into the canal. The odor is horribly offensive. The

practice has gone on for so many years that the butchers claim a prescriptive right to pollute. The City Health Department has moved against them in the Court.

On April 10th, I went with Dr. Jamar, Health Officer for Cecil county, to Port Deposit. About a mile above Port Deposit, between the railroad and the Susquehanna river, is an abundant log boom. It is now and has for many years been merely a stagnant pool, and is believed by those who live near to be productive of much of the malarial disease which prevails there. It is undoubtedly an unhealthy nuisance, and I have therefore served notice upon the governors of the Susquehanna canal that it must be drained. Some doubt exists as to the ownership of the property, the Reading Railroad Company having been recently negotiating for it.

On Thursdey, April 15th, I attended Court at Towson, having been summoned to testify in a suit of certain persons against the National Milling and Mining Company, for the maintenance of a nuisance. The National Milling and Mining Company produce sulphate of barium from rock mined in Missouri. In the process, quantities of sulphur dioxide and of hydrogen sulphide are set free. This had been made the ground of a complaint to the State Board of Health. In company with Prof. Penniman, I made an inspection of the place, and found experiments in progress looking to an abatement of the nuisance, by reducing the sulphuretted hydrogen to sulphur. These experiments did not seem promising. The plaintiffs entered a plea of guilty, and judgment was reserved.

I corresponded with the County Commissioners and the School Board of Carroll county, asking their interest in the meeting of the State Board of Health, at Westminster, on the 13th. I also invited all the Carroll county members of the Maryland Public Health Association to be present at that meeting. It was determined to make examinations of water supplies of as many as possible of the public schools. The chemist has made as many analyses as he can, and his report will be heard at this meeting.

The County Commissioners have kindly placed a room at our disposal, and have accepted our invitation to meet with us as a Board of Health.

On April 22d, I addressed letters to all the brewers, whose beers we have examined, warning them that their products will come under the scrutiny of the Analyst at regular intervals, and if found to contain injurious chemicals be liable to the operation of chapter 519 of the Acts of 1888. In response, one brewer has submitted to me a sample of the preservative used in bottling beer. The chemist has reported it to consist mainly of salicylic acid and alcohol. The brewer has promised to abandon its use.

Pursuing the investigation of the nuisance at Port Deposit, on the land of the Susquehanna Electric Light and Power Company, I found the title to the property to rest with the Susquehanna Canal Company. Mr. George R. Willis, President of the Board of Proprieters, admitted his liability in the premises, and said that he would accept service of a notice to abate immediately on his return from the West. Notice was accordingly served on May 5th.

The secretary has watched with some interest, the progress of the battle for municipal sanitation at New Windsor, Carroll county. In February, the Burgess and Commissioners of Carroll county submitted two ordinances for the approval of the State Board of Health. One provided for the exclusion, after a certain date, of slaughterhouses, and the other of hog-pens, from the town limits. Both ordinances were well framed, and showed due consideration of the interests of the citizens whose privileges would be restricted. The ordinances were approved and passed by the commissioners. There resulted a political fight, which was won by the partisans of the hog-pen.

The hog-pen question is agitating several sections of the State. During the month the assistance of the State Board of Health has been asked by the Baltimore county police in the suppression of such nuisances at St. Denis.

On May 3d, I was asked by Dr. Baltzell, Health Officer for Frederick county, to go with him to Emmittsburg to investigate a nuisance there. We visited Emmittsburg on May 6th. Three nuisances exist there, one at the public school, one due to an overflowing cesspit connected with a hotel and a private house, and the third due to the discharge of a sewer pouring the waste from a dozen houses into an open ditch beside the Frederick and Emmittsburg Turnpike.

Dr. Baltzell called a consultation of the Burgess and Commissioners. The Council seemed agreed to the construction of a complete sewer system. Notice was served through Dr. Baltzell upon 20 persons.

During the month, I have corresponded with Dr. T. A. Councell, Health Officer for Talbot county, and Mr. Alexander Chaplain, secretary Talbot County School Board, in order to learn if the invitation of Dr. Bateman to hold the June meeting in Easton would be well seconded. I find that the invitation is warmly endorsed by both the School Board and the Health Officer. A most comprehensive scheme for the sanitary survey of all the public schools has been proposed. Its scope is so wide indeed, that it is not in the power of the State Board of Health to make such a survey without temporarily abandoning work in other parts of the State. This your secretary is willing to do if the Board deems it wise and expedient.

The suits pending in the Baltimore County Court have not yet come to trial. I herewith show you photographs of several of the nuisances on Gunpowder watershed.

I have received information through the Presbyterian Eye and Ear Hospital, of two violations of the Act to Prevent Blindness in Infants. The cases were referred by me to Dr. McShane, and the midwives are now under bail to answer the charges next week. In one case the eyes of the infant were partly saved, but in the other case total blindness will result. The activity of the Board in the prosecution of these cases of criminal neglect was favorably commented upon at the recent meeting of the Medical and Chirurgical Faculty, and a resolution was passed recommending that the Baltimore City Health Department send a printed copy of the law to every midwife registered in the city. It is to be regretted that we have no means of informing the midwives throughout the State, of their duty in this regard, and that the people generally are ignorant of the serious results which may follow neglect of the eyes of new born infants.

The small bacteriological outfit of the State Board of Health has not yet been put into service because the Bausch & Lomb Optical Co. were unable until within a few days to complete our order.

Through the courtesy of the Governor, we have been able to print the proceedings of the recent Health Conference. An edition of 2,000 copies will be ready for distribution within a fortnight.

The membership of the Maryland Public Health Association has grown to more than 300 persons, and every county in the State, except Garrett, is represented.

In concluding the report for our fiscal year, I have prepared a statement of our use of the Emergency Fuud of $1,000, placed at our disposal by Governor Lowndes, last December. It shows that we have spent $10.36, having $989.64 returnable on the Governor's requisition to the Comptroller. There are no statutory instructions as to the time of reporting upon these funds, but it seems wise to do so at the season when our yearly appropriations expire, and I ask the will of the board in this matter.

JOHN S. FULTON, *Secretary.*

The executive committee audited and ordered paid, bills to the amount of $1,227.60, as follows:

For March.

Salaries	$295 00
Secretary's expenses	16 75
Members' expenses	10 00
Inspector's expenses	39 38
Printing and statienery	39 75
Charts and maps	11 60
Postage	25 00
Stenographer	56 00
Incidentals	4 90
	$498 38

For April.

Salaries	$295 00
Secretary's expenses	16 85
Inspector's expenses	67 90
Chemist's expenses	46 37
Furniture	17 00
Linoleum for offices	64 14
Rent	75 00
Mimeograph and supplies	21 60
Microscope and accessories	108 96
Books	9 00
Incidentals	7 40
	729 22

Secretary's Report, on June 10, 1897.

On May 13, I went with the Board to hold a meeting at Westminster. We were met by the local Health Officer, Dr. J. Howell Billingslea, and Dr. Joseph Herring, who took the members to inspect the Courthouse, Jail and Almshouse.

The plumbing in the Courthouse, which had been altered at the suggestion of the State Board of Health, was found in all respects satisfactory. The Jail was found fairly clean and comfortable.

The Almshouse was found to be in good repair and the inmates well cared for. There were among the inmates two insane persons, who defiled their rooms habitually. On the recommendation of the Board, I have since written a letter to the County Commissioners concerning the management of the Almshouse.

The meeting of the Board was held in Firemen's Hall, and notwithstanding the severe rain, was well attended. The regular order of business was followed, all those present being invited to take part in the discussions. The pollution of water supply by

the conversion of wells into cess-pits was discussed. Resolutions were passed condemning live-well cess-pits, as follows:

Whereas, the health of Westminster is exposed to great and increasing danger from pollution of the soil and water by present system of disposal of night soil;

Therefore it is resolved, That the joint convention of the Carroll County Board of Health and the State Board of Health of Maryland, recommend the Mayor and City Council of Westminster to pass an ordinance forbidding the use of living wells as cess-pits.

The resolution was discussed by Dr. Billingslea, Dr. McShane, Dr. Morris, Dr. Herring, and Dr. Fulton, and was unanimously carried.

The President, Dr. de Krafft, addressed the meeting, thanking the local Board of Health and the School Board for their courtesies and for the evidence of their sympathy with the plans and purposes of the State Board of Health. Dr. Jas. H. Billingslea responded on the part of the authorities of Carroll county.

On May 16th I received from Dr. Urie, Health Officer for Kent county, a sample of cream which, in the shape of ice cream, was supposed to have poisoned two persons at Still Pond. The subject will be reported upon by the chemist.

On May 17th I visited St. Denis, Relay and Avalon, in Baltimore county, in company with Drs. Eareckson and Williams of Elkridge, and Dr. Mattfeldt, Health Officer of Catonsville. At St. Denis there are several objectionable cess-pits, some shallow and uncemented, others dug to flowing water. There were also a number ot filthy surface closets. At Relay a culvert belonging to the Baltimore and Ohio Railroad was found obstrncted, holding back a great deal of water on the north side of the embankment. There was also a large uncovered cistern, belonging to a hat factory, now abandoned.

At Avalon there are but two wells, one unfit for use by reason of disagreeable taste, the other so related to five privies, two pig pens, and two poultry yards, as to be almost surely contaminated.

I also visited Elkridge Landing, and found filthy surface closets in general use, and many wells in dangerous proximity. I served notices on the agents of the property at Avalon, on a number of residents of St. Denis and Elkridge, and upon the Baltimore and Ohio Railroad.

Nearly all the waters of that section have since been examined, and will be reported upon by the chemist.

On May 18th, I went to the Northeastern Police Station to the trial of Caroline Patterson, for violation of the Prevention of Blindness Act. The case was prosecuted by Dr. McShane. A fine of $10 was imposed, and in default, the midwife was committed to jail.

On May 19th, I went with Dr. McShane to the Eastern Police Station to the trial of Mariana Grocka, for the same offence. She was fined $50 and costs, and in default, went to jail.

On May 20th, I went to Towson to attend a meeting of the Baltimore County Medical Association. Some members had advised me that there was a disposition on the part of the Society to take action against the cess-pit nuisance so prevalent in Baltimore county, and I was invited to participate in the discussions. A committee was appointed by the President, Dr. Piper, to present the matter to the County Commissioners.

On May 25th, I appeared before the County Commissioners for Baltimore County in company with Drs. Janney and Sappington, Health Officers, and Drs. Peebles and Stevenson, delegates from the Baltimore County Medical Association. We recommended the passage of an ordinance forbidding the use of an uncemented cess pit within five hundred feet of any dwelling, well, or school in Baltimore county. The County Commissioners heard us respectfully, and answered that they would take the matter under advisement.

On June 1st, I was asked by Dr. Thos. B. Owings, Health Officer for Howard county, to appear at Ellicott city as a witness against a certain butcher at Lisbon, Howard county, indicted for maintaining a nuisance. Owing to the death of a relative upon the date of the trial, I was unable to attend. The jury brought in the remarkable verdict of not guilty, with a recommendation that the Court reprimand the butcher.

On June 3d, Dr. W. H. Baltzell, Health Officer for Frederick County, reported that the City Council of Emmittsburg had decided to accept our suggestions as to the sewerage of the town, and that the work is well under way.

During the month I have endeavored to obtain sanitary surveys of all the public schools of Talbot county, with samples of the drinking water.

We have in that way secured a number of specimens of the drinking water, but the sanitary information has not been such as safe judgment may be based upon.

The sanitary reports upon the buildings and lots have been very satisfactory. Our inspector was so busy elsewhere that we could not spare him for this work in Talbot county. Our experience shows that satisfactory inspections of sources of water supply, and the proper collection of samples, cannot be expected from untrained persons.

JOHN S. FULTON, *Secretary.*

The Executive Committee audited and ordered paid, bills to the amount of $412.99, as follows:

Salaries	$295 00
Secretary's expenses	10 53
Inspector's expenses	62 50
Chemist's expenses	5 10
Members' expenses	25 00
City directory	6 00
Glassware	7 31
Incidentals	1 55
	$412 99

Secretary's Report, on July 8, 1897.

On June 10, I went with the Board to hold a meeting at Easton. The preliminary arrangements made by Dr. T. A. Councell and Mr. Alexander Chaplain, were most satisfactory. Two meetings were held in the High School building, both being well attended. A sanitary inquiry had been mailed to each teacher in the county by Mr. Chaplain, and replies were obtained from about one-third of them.

The Secretary read a report of this sanitary survey of the public schools. The report was discussed by Mr. A. Chaplain, Dr. McShane, Dr. Morris, Dr. Councell, Mr. Nichols, Dr. Dodson, and Dr. Hardcastle, in respect to the questions of vaccination, quarantine, contagious diseases, disposal of nightsoil, and water supply. Dr. de Krafft declared a recess from 1 o'clock to 3.30 P. M.

The meeting was resumed at 3.30 in the presence of a large audience, including, besides those who were present in the morning, the County Commissioners and a number of public school teachers. The question of compulsory vaccination was again taken up by Dr. McShane, who offered the following resolution:

Resolved, That it is the sense of the joint convention of the State Board of Health and the Talbot County School Board, that the County Commissioners of Talbot county, acting as a Board of Health, should at once appoint one vaccine physician for each election district, to carry out the provisions of Act 43 of the Public General Laws, title "Public Health." Seconded by Dr. Morris. The resolution was discussed by Dr. Morris, Mr. Haddaway, Dr. McShane, Dr. Councell, Dr. Fulton, Mr. Chaplain, and Dr. Dodson, and was unanimously carried.

Dr. Fulton then gave an illustrated lecture upon bacteriology, employing some of Dr. E. M. Hardcastle's pupils to demonstrate the results of brief instruction upon the classification of microorganisms. It is worth recording, and the audience were pleased to observe, that out of a considerable number of tests, one error was made by one member of the class.

The president, Dr. de Krafft, made an address, outlining the plans of the Board, indicating its needs, and thanking the people of Easton for their cordial welcome and co-operation. Dr. Edward M. Schaeffer spoke upon the sanitary condition of Talbot county, and the work of the Maryland Public Health Association. Remarks upon the same subject were made by Dr. John Morris and Dr. Fulton.

On June 14th, certain complaints concerning the pollution of a stream in Baltimore county were referred to Dr. Sappington, County Health Officer. Samples of water were obtained for the Chemist, and have been reported upon, but the report of Dr. Sappington has not yet been made.

On June 15th, went to Arlington with Dr. McShane, to inspect nuisances there. The ditch on the Reisterstown Turnpike, was found in a state of nuisance, as was also the ditch crossing the property of Arlington Improvement Company, and the culvert at the crossing of Western Maryland Railroad, and the Baltimore Traction Company. The newly installed sewage filtration plant of the Electric Park Company was examined, and also the portion of the property not so furnished. A number of notices were served.

On June 15th, I reported to Dr. James Urie, as follows:

"I enclosed you a copy of the chemist's report just received. You will observe that the poison isolated is an organic poison, not recovered in sufficient quanity to identify as tyrotoxicon, but very probably that substance. As it is an organic poison, and gives some of the tyrotoxicon reactions, it is probably not a substance introduced with intent to adulterate the cream, or to do injury to consumers, but it is a substance formed in the cream, under conditions unintentionally supplied by the maker. The identification of tyrotoxicon is an exceedingly difficult matter to demonstrate to the satisfaction of a Court, the best evidence usually going to show that the substance found is not any other known poison. It is believed never to be produced where ice cream is made of sound materials with clean apparatus."

I enclosed report from Dr. Penniman, as follows:

"I have examined the sample of ice cream from Dr. Urie, and have not been able to identify the poisonous substance present. I isolated an organic alkaline substance, which gave some of the reactions for tyrotoxicon, but the quantity obtained was too small for me to purify or make exhaustive tests."

On June 17th, I went to Cambridge to investigate an epidemic of scarlet fever. A considerable number of cases had occurred, and some twenty odd were then in progress. The school vacation had begun, and the Sunday schools were closed on account of the disease. Through the assistance of Dr. de Kraft, I was enabled to meet the Town Council in company with Drs. T. B.

Steele, Guy Steele, John Mace, S. Chase de Kraft, Fort, Mr. George B. Woolford, and Dr. James Bryan, secretary of the School Board. An effort was made to impress them with the urgent need of municipal sanitation, particularly with reference to infectious diseases. I have since sent the council, at their request, a set of ordinances framed to suit the needs of their town.

On the 20th, I went with Dr. McShane to visit Ocean City. We made a sanitary inspection of the town, which will be the basis of separate reports to the town authorities, the Sinepuxent Beach Company, and the Atlantic Hotel Company. I obtained three samples of water, and have arranged with the local Health Officer, Dr. W. Guy Townsend, to secure samples from all the wells on the beach.

On the 23d, I visited Ellicott City, and with Dr. Owings inspected the stream and mill races which act as sewers for the town. I learned of an epidemic of scarlet fever at Oella, which information was referred to Dr. Mattfeldt, Health Officer for Catonsville.

I have received from Dr. James O. Bullock, Health Officer for Lonaconing, a letter informing me of the passage of a good code of sanitary ordinances by the Town Council. A copy of the code was enclosed. Besides the usual nuisance and offensive trade ordinances, it contains a set of funeral regulations, which require record to be made of every death occurring. This is the most important step taken by any town in Maryland towards the collection and preservation of Mortuary Statistics.

The Baltimore County Medical Association has invited the State Board of Health to meet them in Towson on the 15th, to discuss the disposal of night-soil and the construction of cesspits. The profession in Baltimore county are heartily interested in public Health, and have ably seconded the efforts of the State and County Boards to make an end of the leaching cess-pit nuisance so prevalent in Baltimore county.

Nuisances reported from Annapolis Junction and Curtis Bay were referred to Dr. J. M. Worthington. Several nuisances in Baltimore county have been referred to Dr. Sappington and Dr. Mattfeldt. The nuisance at Port Deposit, on the property of the Susquehanna Canal Company, has not been abated, and I await the instruction of the Board before instituting legal proceedings.

During the month I have made a few bacteriological examinations for the purpose of diagnosis, but have not had time to make any bacteriological examinations of water.

John S. Fulton, *Secretary.*

The executive committee audited and ordered paid, bills to the amount of $336,77, as follows:

Salaries	$295 00
Secretary's expenses	5 17
Inspector's expenses	12 60
Chemist's expenses	6 15
Members' expenses	12 30
Incidentals	5 55
	$336 77

SECRETARY'S REPORT, ON AUGUST 14TH, 1897.

The regular meeting sf the State Board of Health was held at Ellicott City, in the Howard County Court House. There were present: Drs. John Morris, Jas. F. McShane, S. Chase de Krafft, John S. Fulton, Prof. W. B. D. Penniman, Mr. Chas. N. Mitten, Dr. Thos. B. Owings, Health Officer for Howard County, Samuel J. Fort, B. J. Bryne, of Ellicott City, Dr. P. F. Sappington, of Govanstown, Dr. Luke M. Shipley, Secretary of Howard County School Board, Mr. J. T. Thompson, and a nnmber of the public school teachers of Howard county and citizens, of Ellicott City.

A very successful sanitary survey of the public schools of Howard County had been made during the previous month, and samples had been collected by Mr. Mitten, of all the water supplies of the public schools.

The report of the analyst was read, and the secretary read his report upon the sanitary survey of the public schools. These reports were discussed by Dr. John Morris, Dr. Samuel J. Fort, Dr. T. B. Owings, Health Officer for Howard county, Dr. Jas. F. McShane, Dr. Fulton.

The unsanitary condition of the Tiber in Ellicott City was discussed by Dr. Thos. B. Owings, Dr. McShane, Dr. de Krafft, Dr. Fulton, Dr. Morris and Mr. Joseph D. Maguire, State's Attorney for Howard county.

The reports were adopted, and the following resolution offered by Dr. McShane, was passed:

Be it resolved, That if the matter be properly brought to the attention of the State Board of Health by any two legally qualified practitioners, or any three or more persons affected thereby, of the insanitary condition of the stream, or water course, flowing through Ellicott City, and known as the Tiber, and in which deposits of offensive and noxious matter from houses or buildings on the banks of this stream or water course, are allowed to accumulate to the detriment of the community, and endanger the public health, that the said Board, through its secretary, be and are hereby directed to carry out the requirements of sections 35, 36 and 38 of the Code of 1888, Article 43, of the Public General Laws.

July 10th, I went to Arlington. Met Dr. Sappington, Health Officer for Baltimore county, and Dr. J. H. Billingslea, President of the Reistertown Turnpike Company. Found the ditches all cleaned except those of the Turnpike Company. Dr. Billingslea promised that his company would do the required work, and it has since been done. Had also an interview with Mr. Fenneman, proprietor of Electric Park. Mr. Fenneman has since put down a wooden trunk to carry off all the waste from the club house down to the Western Maryland Railroad culvert.

On July 12, I went with Dr. P. F. Sappington, Health Officer for Baltimore county, to inspect a factory at Dundalk. At this place animal hair is treated by steam in closed tanks, and being reduced to a pulverulent condition, is milled and sold to fertilizer dealers. The odor about the place is that of bad cooking. No evidence was offered by any resident that health is in any way affected, the only ground of complaint being that the factory prevented the development of real estate interests in the neighborhood. The complainants were informed that their remedy was through injunction proceedings, and that the State Board of Health could not take up a case involving only property interests.

July 15, went with Dr. DeKrafft and Dr. McShane to attend the meeting of the Baltimore County Medical Society for a discussion of the cess-pit nuisance. Papers were read by Dr. McShane and myself, and a general and very earnest discussion followed. The County Commissioners were invited, but were not present. Resolutions were passed and ordered sent to the County Commissioners, condemning the leaching cess-pit and the living-well cess-pit as seriously threatening public health in Baltimore county.

July 16, went to Elkton, and with Dr. Howard Bratton, Health Officer for Cecil county, inspected the town. Several sections of the town were found to be quite filthy, and one section in an especially foul and unwholesome condition. The public water supply of Elkton is not above suspicion as to quality, and is insufficient in quantity. A number of private wells were found to be very bad. In the evening the Town Council met, with a large number of private citizens. Dr. Howurd Bratton read a paper upon the general sanitation of the town. The discussion was participated in by Dr. J. H. Jamar, Dr. Charles M. Ellis and myself. The establishment of the dry-box privy system and a scavenger service were strongly recommended by all the speakers. The mortality rate of Elkton was referred to by Dr. Ellis, who said that the figures for Elkton sometimes exceeded those of large and unhealthy cities.

The Town Council seemed impressed with the arguments made, but have since publicly announced that the representations of their physicians were greatly exaggerated.

July 22d, I went to Relay station, to inspect the work done at the instance of the State Board of Health upon the culvert at Relay. The culvert is now clean and the branch above the embankment thoroughly drained. The water has not, however, a free way to the river below the embankment, and the restoration of the culvert will subject lands upon the lower side to flooding. I submit drawings of the work.

July 24th, I went to Cambridge with Mr. Mitten, to operate against the epidemic of scarlet fever. On July 10th, I had written to the town commissioners, that unless they took effective measures against the epidemic, we should take the situation into our own hands under 1886, 22, and 1890, 622.

Immediately on my arrival, I notified the Mayor, J. G. James, of our presence and intention. An hour later, I was warned by Mr. Milbourne, Counsel to the Commissioners, that our presence in Cambridge, was an invasion of the local rights, and that entrance upon private property for disinfection or other sanitary purpose would be trespassing.

I visited all the physicians, and secured a list of houses and cases. Early in the afternoon Dr. de Krafft handed me a letter which had been sent him by Mr. Milbourne, repeating substantially his conversation with me in the morning. The Commissioners of Cambridge, through their counsel, Mr. Milbourne, lodged a complaint with Judge Henry Lloyd, and prayed an injunction restraining the State Board of Health from interfering in any way with local sanitation. Having been advised by Mr. Clabaugh, Attorney-General, to retain a local counsel, I consulted Mr. Phillips L. Goldsborough, and learning that further operations on our part would weaken our position in the injunction proceedings, I authorized him to accept service and returned to Baltimore. I have since furnished Mr. Goldsborough with the data upon which to construct our answer to the bill of complaint. The answer has been made, but I do not know that it has yet been filed.

On Friday, August 6th, Dr. John Mace, Health Officer elect for Cambridge, had a conference with me in Baltimore upon the methods of disinfection. I offered him the use of the apparatus and material which we left in Cambridge. Dr. Mace reported that a number of new cases have occurred since the injunction proceedings were begun, and also said that the Commissioners have not yet named his salary, and that he has not qualified as health officer in accordance with the local ordinance.

On August 10th, I visited Arlington to inspect the Linden Heights property with Dr. Sappington. This is a summer boarding house, accommodating 120 people. One hundred and six persons were there on the 7th. The water-closets discharge into a series of three cess-pits, about 4 feet wide and about 12

feet deep, of loose brick. The pits are full and overflowing. About 60 yards away is the drinking well, and about 70 yards distant is the kitchen and bath supply. There is a surface closet somewhat nearer the drinking well and much nearer to the other well. This surface closet accommodates 15 servants. There is no box, the deposits lying on a solid rock.

Two cases of typhoid fever have occurred within two weeks among the guests. The landlady is convalescent from "inflammation of the stomach and intestines." The guests have all gone. Samples of water were sent Prof. Penniman. The milk supply is from a farm at a short distance, where no sickness of any sort has occurred.

JOHN S. FULTON, *Secretary.*

The executive committee audited and ordered paid, bills to the to amount of $489.80, as follows:

Salaries	$295 00
Secretary's expenses	16 45
Inspector's expenses	67 60
Members' expenses	23 75
Rent	75 00
Glassware	6 50
Incidentals	5 50
	$489 80

SECRETARY'S REPORT, ON SEPTEMBER 9, 1897.

On August 11, Dr. George Everhardt reported that Mr. Joas Gill, Chowan, Md., had a number of pig-pens so constructed as to include part of a branch of Western Run, which forms part of the Baltimore city water supply. I wrote to Mr. Gill, calling his attention to the violation of the law.

On August 12, certain nuisances were reported at Delmar, Md., by Mr. Samuel Foskey. The matter was referred to Dr. Charles R. Truitt, Health Officer of Wicomico county. Dr. Truitt has since reported to me the reaults of his investigation and action. Delmar is situated on the line between Wicomico county, Md., and Sussex county, Del., and having no local health government, is in care of two county health officers.

On August 13, certain nuisances were reported to me by Mr. J. James Todd, of Solomon's Island, and were referred to Dr. T. M. Chaney, Health Officer for Calvert county. No further report upon the subject has been received.

On August 16, I left for Nashville, Tenn., where I attended the meeting of the National Conference of State Boards of Health

on the 18th and 19th. This meeting was well attended by representatives from State Boards of Health in all parts of the Union and from Canada and Mexico. The question of Tuberculosis in Asylums and other public institutions was discussed in an interesting, instructive way. Maryland experience occupied an honorable place in the chief paper, which was read by Dr. Bracken, of Minnesota. The same subject was treated from the point of view of municipal sanitation, by Dr. Evans, of South Carolina. Dr. McShane was heard in the discussion on this topic. Tuberculosis was also considered in its relations to the dairy industry, by Dr. Lee, of Pennsylvania, and Dr. Schrader, of Iowa, and the application of mandatory measures to the restriction of measles, whooping cough, leprosy and tuberculosis were discussed by Dr. Baker, of Michigan.

The feeding of hogs with slaughterhouse offal and the meat from knackers' yard was proposed for discussion by the Board of Health of Quebec. The topic was handled by Dr. Wingate of Wisconsin, and Dr. Patton, of Louisiana. Your secretary took ground in the discussion against the practice. An excellent report was made by Dr. Swarts, of Rhode Island, upon vaccine farms. Perhaps the most important and interesting business was the report of the Committee on Transportatien and Disinfection of Bodies Dead of Infectious Disease, by Dr. Scott, of Illinois. This report was the result of a meeting in Cleveland, June 9th, 1897, of delegates from the National Conference, the National Funeral Directors' Association, and the General Baggage Master's Association. Representatives of both the latter bodies were present at Nashville, and were accorded the privilege of the floor.

The discussion was of great interest, and the conclusions very valuable. A set of rules were offered for adoption by the Conference, and after some minor modifications, were adopted. The exact text of these rules I am not able to present, but in their original form were published in the Ohio Sanitary Bulletin for July. It is meant to embody these rules in laws to be offered at every State Legislature, in the hope that uniform practice may be secured throughout the United States. The subject is of vast importance, and it is believed that the purpose of the committee will be effected.

On August 24th, a case of diphtheria was reported to me by Dr. Massenberg of Towson. I referred the matter to Dr. P. F. Sappington, Health Gfficer for Baltimore county. The child has since died, and under my advice Dr. Sappington has disinfected the house, destroying such articles as could not be disinfected.

On August 24th, I received a box of water samples from W. B. Mellinger, Mayor of Cumberland. The State Board of Health was asked to investigate the operations of the Piedmont Pulp and Paper Works at Luke, thirty miles above Cumberland.

On the same date, Dr. J. B. Robinson, of Brooklyn, reported an outbreak of diphtheria, which was referred to Dr. J. M. Worthington, Health Officer for Anne Arundel County.

On the same date, Mr. David Fellheimer reported a death from typhoid fever, believed to be due to the water of a well at Har Sinai Cemetery. A sample of the water was examined and condemned.

On the same date, Dr. Richardson of Great Mills, St. Mary's County, reported an outbreak of scarlet fever. I wrote to the School Examiner, Mr. Geo. W. Joy, to confer with Dr. Richardson before opening the schools at that place.

On August 25th, Dr. Chas. R. Truitt, Health Officer for Wicomico county, reported an outbreak of typhoid fever, believed to be due to drinking water. He forwarded samples which proved impure.

On August 28th, I received a letter from E. F. Smith, superintendent of the Reading Terminal, that certain parties at Port Deposit had threatened the Company with legal proceedings if the log boom was opened at that place. He assured me that everything ordered by the State Board of Health has been done, except to open the culvert and drain the pond. I gave him permission to keep the water in, until the 1st of November.

On August 28th, I went to Queponco, Md., to investigate an outbreak of typhoid fever. Queponco, or Newark, is a small village of 150 inhabitants, in Worcester County. I found quite a number of premises in a filthy condition, although several persons, stimulated by three deaths from typhoid fever, had begun to clean up and drain. Most of the water supply is from open wells, often enough in close proximity to privies and pig-pens. The county road and many vacant lots were overgrown with rank weeds, and the ditches were blocked. I served notices upon the County Commsisioners, upon several citizens, and upon the Delaware, Maryland and Virginia Railroad. I also obtained three samples of water from the wells supplying the infected families.

On August 31, I went with Mr. Mitten to Cumberlaud. On September 1st, we went up to Luke and visited the pulp and paper mills. Spruce logs are reduced to fine chips and then digested in a liquor, which is made by exposing a spray of milk of lime to the fumes of sulphur dioxide. After digestion the pulp is bleached with chloride of lime, washed in clear water and passed on to the paper mills, where it is treated with dyes and a mixture of kaolin and rosin. The effluent from the mills is all discharged into the Potomac river. The distance from Cumberland water works is thirty miles. We took samples from the Potomac above and below the works, and also from the sewers of the mills. At Cumberland, samples were taken at the intake on the

Potomac, from Wills creek at the West Virginia Central Railroad bridge, and from the experimental filter. The superintendent of the city water works was furnished with demijohns, for the collection of any other samples which he might want analyzed, and he has since sent up a sample of the water of George's creek, which empties into the Potomac at Piedmont. George's creek receives the sewage of Lonaconing, a town of 6,000 inhabitants. The Potomac also receives the sewage of Keyser, West Virginia, a few miles below Piedmont.

On September 2, I received a letter from Dr. T. A. Councell, Health Officer for Talbot county, complaining that the citizens of Cambridge were throwing into Choptank river the bodies of hogs dead with cholera, and that these carcasses floated ashore in Trappe District, Talbot county. I referred the matter to the Sanitary Live Stock Board.

On September 4, I received samples of water from Dr. Wm. L. Lewis, Health Officer for Kensington, Montgomery county, who reported an outbreak of typhoid fever at Garrett Park. On the same date an outbreak of diphtheria was reported by Dr. J. A. Stevens, at Oxford. This matter was referred by me to the County Health Officer, Dr. Councell, and to the Secretary of the School Board, Mr. Alexander Chaplain.

John S. Fulton, *Secretary.*

The Executive Committee audited and ordered paid ,bills to the amount of $380.74, as follows:

Salaries	$295 00
Secretary's expenses	17 29
Members' expenses	20 00
Inspector's expenses	14 45
Chemist's expenses	1 90
Book binding	16 85
Awnings	9 00
Incidentals	6 25
	$380 74

Secretary's Report, on October 14th 1897.

On September 11th, in response to a telephone from Dr. Thomas B. Owings, Health Officer for Howard county, I went to Woodbine, and from there to Poplar Springs to investigate an outbreak of typhoid fever. There had been one fatal case not reported to this office.

We found three cases in as many different houses. They all used one spring for water-supply, though there were four available sources. The spring, which they used for drinking, was

enclosed by a fence, but was in an uncleanly condition. Hogs were roaming about outside the enclosure, and the land was marshy. The water of this spring was used for cooling milk and washing cans. Samples were taken of all four supplies One well was found chemically impure, and the spring was condemned upon the sanitary survey. The families affected did not heed the instructions of the local Health Officer, Dr. Owings, and new cases have since occurred.

I also visited Lisbon, and inspected there a slaughterhouse against which an action was pending, and which had been the subject of recurrent complaint for several years. This is the case in which I was summoned to testify, and in which the jury gave a verdict of acquittal, but recommended that the butcher be reprimanded by the Court.

On September 14th, I went to Ocean City, and read before the Medical and Chirurgical Faculty, a paper upon the Sanitation of Seaside Resorts. While there I examined a number of premises, and saw a family of residents who had "continued fever." The mother and one daughter were convalescent. Two younger children were then sick. Through the kindness of the attending physician, I was able to get a sample of blood from three of the cases. Two of these samples gave positive reaction with the Vidal test for typhoid fever. At the same meeting, Dr. E. J. Dirickson read a paper upon "the Hygienic Advantages of the Maryland Seacoast."

These papers on sanitary subjects elicited much discussion, and I hope aroused the interest of the municipal authorities at Ocean City.

On the 17th, I received notice of an outbreak of diphtheria at Glyndon, Baltimore County, which I referred to Dr. P. F. Sappington, who has reported to me in full.

On the 20th, I received a letter from Mr. Geo. A. Pearre, State's Attorney of Allegany County, asking my assistance in the investigation by the Grand Jury of pollutions of the Potomac river. I went to Cumberland on the 23d, and interviewed the State's Attorney Mr. Pearre, Mr. Gordon, City Attorney, and several members of the City Council. I also submitted our evidence so far as it was then prepared. A public meeting was held in Cumberland on that date, to protest against the pulp and paper mills at Luke. I was not invited to the meeting and was not present. It is said, that the State Board of Health was severely criticized and its chemical report ridiculed by one of the speakers.

On the 21st, His Excellency, Governor Lowndes, referred to me a communication from a local health officer, which it may be worth while for the board to consider. It asserts this board is operating for political ends.

On the 23d, I issued a notice against the Easton Creamery Company, requiring the abatement of a nuisance. The matter was promptly attended to by the State's Attorney for Talbot county, and the nuisance abated.

On the same date I wrote to Governor Lowndes, asking his permission to use part of the Emergency Fund, if it should be necessary, to inspect passenger trains at Cumberland, to guard against the introduction of yellow fever. In an interview with His Excellency, at Cumberland, on the 24th, he gave his consent.

On the 27th, I received notice of an outbreak of typhoid fever at Preston, Caroline county. I referred the communication to Dr. F. R. Malone, Health Officer for Caroline county. I have since received a detailed report with plot of the infected district. Ten cases with three deaths were reported by one physician.

On the same date, I received a letter from Mr. Knott, of Washington, reporting that since the drainage of Haar lakes, malarial fevers had disappeared from Forest Glen, Montgomery county.

On the 28th, an outbreak of typhoid fever was reported at Still Pond, Kent county, by Dr. James W. Urie. Samples of water were sent, and have been examined by the chemist and reported to Dr. Urie.

An outbreak of typhoid fever was reported early in the month at Brooklyn, Anne Arundel county. Dr. Worthington, Health Officer for Anne Arundel county, and Dr. J. H. Brooke investigated. Mr. Mitten went to Brooklyn and obtained a dozen samples of water for chemical examination Later Dr. Brooke and Mr. Gischell called upon me and asked for bacteriological examinations. Mr. Gischell said that the County Commissioners would pay for the examinations. Eleven samples were collectad by Mr. Mitten, under the direction of Dr. Brooke, and sent to Dr. Stokes' laboratory. They have since been reported upon.

On September 28, I issued notices against Chester W. Stack, of Carroll county, and G. W. Turner, of Lutherville, for polluting streams forming part of the Gunpowder water supply.

On September 30, I addressed letters to twelve milkmen in Highlandtown, directing them to abandon the use of dangerous wells on their premises, and notifying them that their names and addresses, with information concerning their water supplies, had been sent to Dr. McShane, City Health Commissioner.

Complaints reached us from Kent and Somerset counties, during the month, of the unlawful exposure of the bodies of hogs dead of infectious disease. The matters have been referred to the Live Stock Sanitary Board.

On October 1st, Dr. Piper of Towson notified me of an outbreak of diphtheria at Towson. Of four cases, one was fatal. The premises were thoroughly disinfected.

John S. Fulton, *Secretary.*

The Executive Committee audited and ordered paid, bills to the amount of $428.83, as follows:

Salaries	$295 00
Secretary's expenses	79 93
Members' expenses	10 00
Inspector's expenses	25 90
Chemist's expenses	3 50
Stationery	13 00
Incidentals	1 30
	$428 83

Secretary's Report, on December 9th, 1897.

On October 8th, all the chemist's reports being in, I completed the report to the Mayor and City Council of Cumberland upon their water-supply, as follows:

To the Mayor and City Council
of Cumberland, Maryland.

Gentlemen:

At the regular meeting of the State Board of Health, held September 9th, 1897, the complaint of the Mayor and City Council against the Piedmont Pulp and Paper Company was considered, together with the report of the secretary upon an inspection of the Potomac and of the Pulp Mills at Luke. The following resolution was passed:

"Resolved, that the State Board of Health direct the secretary, in replying to the Mayor and City Council of Cumberland, in reference to the condition of water-supply of said city, to give a full report of the complete analyses of the water of said city and of the sanitary inspection of all the sources of contamination thereof, and that the State Board of Health will give every aid and advice consistent with law in the abatement of the various nuisances and the removal of source of contamination."

Pursuant to these instructions, I beg to submit the following preliminary report upon the water supply of Cumberland:

The Potomac river, from which the whole of the public water supply is drawn, has been of bad quality for many years. The first city water-works were constructed in 1871. It may be presumed that the water of the Potomac was then potable, though this presumption is supported by no other evidence than the installation of water-works.

In 1876, we find the first public criticism of the Cumberland water supply by Dr. Charles H. Ohr.

In 1880, the capacity of the pumping station was enlarged.

In 1881, the contamination of Cumberland water supplies, both public and private, was the subject of a paper by Dr. D. P. Welfly, in the Report of the State Board of Health. In this paper occur the earliest chemical reports which we have seen upon the Potomac water.

In 1891, analyses were made for the State Board of Health by Prof. William Tonry, and in 1895 and 1897, chemical examinations were made by Prof. W. B. D. Penniman.

We, therefore, have a chemical history of the Potomac water at Cumberland for the past fifteen years. At no time during this period has the river water been good. Throughout that time the water as delivered at the spigots has been bad.

The report of 1881 gives no residues, and nitrogen only in the form of ammonia. That of 1891 contains no estimates of nitrogen, except as ammonia. Nevertheless, the series of examinations will show that while the Potomac water is of very variable quality, its general character in 1897 is a little worse than at the time of any previous examination.

We have examinations of the river above the pulp mill in the years 1893, 1895, 1897. A comparison of these reports show that during the four years the solids fell from 100 to 66; chlorine rose from 3.8 to 10.8; nitrogen rose from .218 to .567 and fell to .105. As to chlorine, Potomac water is now at Cumberland exactly what it is above Luke; nitrogen is nearly doubled between these points, and the residues are nearly quadrupled.

We have bacteriological examinations by Prof. Miller in 1891, and by Dr. Stokes in 1897. Comparing those made at the pump-house it is found that there were 3,256 colonies per c. c. in 1891, against 2,802 colonies per c. c. in 1897. Dr. Miller's examination shows that the bacteriological contamination more than tripled between the intake and the pump-house, and was multiplied by 5 (5,554) before reaching the consumer. Prof. Tonry reached the same conclusions chemically in 1891, finding that the water received organic contamination between the intake and the pump-house, and again between the pumps and the service spigots. The importance of these last observations, will be apparent later.

Looking at the sonrces of contamination, we will begin with the most remote of those inspected by the Board.

The Piedmont Pulp and Paper Company at Luke, 30 miles above Cnmberland, take about 800,000 gallons a day of Potomac river water, which they pass through a chemical and sand filter before using in their works. The effluent of the two sewers from the pulp work show residues of 1418, chlorine 165.5 and nitrogen 136. From the paper mill the effluent was not examined. It contains large quantities of kaolin, rosin and dye stuff.

A sample taken from the river below the works, shows residue 278, nitrogen .042, and cholorine 10:8.

The effluent of these mills is a serious contamination of Potomac water, and is pollution of a sort that cannot be gotten rid of except by chemical treatment.

Just below the Pulp Mills, the towns of Piedmont and Westernport pour their sewage into the Potomac.

Half a mile below Westernport and one mile below the Pulp Mill, George's creek flows into the Potomac. The total solids in the water of George's creek are 1,782 parts per million. Chlorine 14, albumenoid ammonia .15. The inflow of George's creek into the Potomac alters the character of the water by increasing the residue to 2018. This exceeds the sum of the residues of the two streams, and the cause of this alteration requires further study.

George's creek bears the sewage of Lonaconing (4,000 inhabittants,) that of Frostburg (4,000 inhabitants,) Barton (1,600 inhabitants) and Midland. At Lonaconing are six slaugterhouses and a large laundry emptying into the creek.

George's creek also receives from a large number of coal mines quantities of waste water rich in sulphates.

At Barton are two slaughterhouses and a tannery, discharging into Bartlett run, and so reaching George's creek.

At Keyser, W. Va., New creek empties into the Potomac, bringing all the sewage of a town of 1,600 inhabitants, and the waste from a large tannery, situated about six miles above Keyser.

At Cumberland, just below the confluence of Will's creek and the Potomac river, is a dam. Just above, and to the east of the dam, are the gates of the basin of the Chesapeake and Ohio Canal. This dam affects the current of the Potomac for a distance upward of four miles. It converts that part of the river into a large settling basin for the mingled waters of the river and Will's creek.

Will's creek receives the drainage of all those parts of Cumberland lining its banks. More than one hundred privies are built upon its retaining wall, three sewers, and the waste from the gas house, tannery, a dye house, a brewery, a distillery, a cement mill, a pulp mill, a glass factory, soap factory and slaughterhouse empty therein.

Into the Potomac branch of the reservoir flow two open drains which bear the waste of privies and water-closets. The intake-pipe is 1,300 feet long and is crossed by the drains just mentioned.

Will's creek has a residue of 398; chlorine, 26; free ammonia, .29; albumenoid ammonia, .24. There is no reasonable doubt that the water contained in the basin, formed by the dam, is the mixed water of Will's creek and the Potomac river.

Under certain circumstances currents flow up the Potomac from Will's creek, and as the influence of the dam is perceptible

at three miles distance, the influence of Will's creek must be always present at the intake-pipe, which is but 1,600 feet distant. Cumberland is, therefore, pouring the vile water of Will's creek into its reservoir.

The only other sources of contamination are to be looked for in the water-works.

If our examinations confirm the findings of Prof. Tonry and Dr. Miller, we shall have to conclude that the receiving and distributing plant is seriously defective. Dr. Miller found that the bacterial contamination of the Potomac water was multiplied more than five times between the intake and the consumer. Prof. Tonry found that the water received chemical pollution from the soil through which your inflow-pipes travel, and that your pumping-well will, under certain conditions, drain the soil about it. *Our own findings do not as yet confirm or controvert these findings. So far as we have gone with our work, we can state with positiveness that the conversion of Potomac water into a potable supply can be effected by—

1st. Building a second dam across the Potomac above Will's creek.

2d. Diverting into another channel all the drainage of Cumberland at present emptying into the north branch of the Potomac river.

These two procedures are indispensably perequisite to any plan of rendering Potomac water potable at Cumberland.

3d. It will be necessary to purge the water of the pollution which it brings from above. This can be partly accomplished by abating, as far as possible, the many nuisances and sources of pollution upon the stream and its tributaries. If the various industries, whose wastes are poured into the river, are permitted to continue their pollution, it will be also necessary to subject the water to chemical treatment. The matters in solution which cannot be removed by filtration come from the pulp and paper mills, tanneries, and mines. If it is desired to avoid the expense of chemical purification of the water, movement must be made against all of these industries, since it cannot be determined what relation any of these contaminating factors bear to the whole pollution.

The principle is well established that a stream may not lawfully be so used as to injure the proper use and enjoyment of its waters by any riparian owner, and if this principle can be successfully applied to the large water-shed of the Potomac, above Cumberland, it may be possible to avoid the expense of chemically purifying the Potomac waters.

*Our subsequent findings did not confirm this suspicion, and it was learned later that the defects in the receiving and distributing mains have been for the most part corrected.

This reform cannot be carried so far as to relieve the city of necessity of constructing a filter bed and reservoir. Some method of filtration to remove suspended matter and bacteria must, in any event, be practiced. Organic pollution cannot be prevented without depopulating the banks of the stream. Many sources of contamination can and ought to be removed, and the work of a filter would be correspondingly lightened.

Finally, it remains to consider the competency of your system of water delivery. If it be true that the pollution of river water increases in passing through 1,600 feet of intake pipe, there must be serious defects of construction or material. If this pollution increases in the distributing mains, a similar criticism falls upon the delivery end of your water-works. Further investigations will be made upon this point.*

As your communication to the State Board of Health had exclusive reference to the Piedmont Pulp and Paper Works, it is necessary to show why this Board has made a more extended inquiry than that to which it was invited. A movement against the Piedmont Pulp and Paper Company can only be made by the State Board of Health under chapter 6 of the Acts of 1886. This law makes the State Board of Health the guardian of the water-supplies of every community and household in the State, and its operations must be directed against all pollutions affecting the use of water for drinking and domestic purposes. Beyond this the State Board of Health is not an arbiter of riparian rights. The purpose of the law being to secure purity of water supply, its action must not stop short of that end.

In this case a city complains against a factory 30 miles away, at the end of a populous water-shed. Manifestly, the State Board of Health must take cognizance of all pollutions along that water-shed, and must not proceed against one to the exclusion of others, unless convinced that the removal of one source of pollution will render the water fit for drinking and domestic purposes.

A movement against the Pulp Mills at Luke, will be but one of a series of actions, and it is necessary for the City Council of Cumberland, to consider whether the interests of the city will be advanced by the probable results of a number of actions at law against the factories, mines and other pollutions of the Potomac river. It is worth while to observe in conclusion that a most important preliminary to this work will be prompt action upon your part against the causes of contamination in your city.

Very respectfully yours,

John S. Fulton, *Secretary.*

*Further examination did not reveal any serious defect in the distributing mains or in-take pipe.

The following summary of chemical and bacteriological examinations was enclosed, together with Prof. Penniman's report in full:

HAINES, 1881.

Hydrant water,	Aug. 17,	Ammonia,	.256.	Chlorine,	10.3—19 days, after rain.
"	Sept. 15,	"	.224.	"	6.86—47 "
"	Sept. 16,	"	.394.	"	8.57—16 hours after rain.
"	Sept. 17,	"	.176.	"	5.14—12 days "
"	Oct. 26,	"	.140.	"	5.14—water low.
"	Oct. 26,	"	,122.	"	3.43—B. & O. supply.
"	Dec. 12,	"	.038.	"	5.14—water low.
"	Average,		.192.		6.37.

TONRY, March, 1891.

Water at intake,	Solids,	140.6,	Ammonia,	1.00,	Chlorine,	5.14.
" in receiving-well,	"	140.6,	"	1.00,	"	5.14.
" in settling-well,	"	174.07,	"	1,50,	"	8.57.
" from pumps,	"	132.9,	"	0.80,	"	6.00,
" spigots 2,500 feet from pump,	"	142.3,	"	0.90,	"	6.00.
"		146.00,		1.04,		6.17.

1895,	Average Nitrogen,	.729.	Chlorine,	7.47.
1897,	"	.9.	"	10.8.

MILLER, 1891.

River water at entrance-pipe, 1,056 colonies per c. c.
Cistern at pump-house, 3,255 " "
Spigot on the main (city supply), 5,554 colonies per c. c.

STOKES, 1896.

River water from Pumping-well.

Clear. White scum forms on surface, green sediment. Both scum and sediment consist microscopically of a variety of infusoria, called monas. No microscopic plants present. Colonies per c. c. 2,802. Bacillus coli communis present in 0.5 of a cubic centimeter of water. Water. bad.

Potomac above Pulp Mills.

DATE OF ANALYSES.	Aug. 4. 1893.	Dec. 20. 1895.	Feb. 6. 1895.	Sept. 3. 1897.
Total solids................	100	84	54	66
Ignited solids..............	91	22	20	18
Volatile solids............	9	62	34	48
Chlorine..................	3.8	10.6	2.	10.8
Free ammonia.............	.033	trace	.02	trace
Albumenoid ammonia.....	.135	0.5	.114	.105
Nitrates..................	trace	trace	.95	trace
Nitrites..................	none	none	none	trace

George's Greek.

DATE OF ANALYSES.	Aug. 8. 1893.	Dec. 20. 1895.	Sept. 2. 1897.
Total solids	1,698	1,374	1,782
Ignited solids	1,372	569	1,072
Volatile solids	325	805	710
Chlorine	6.2	13.3	14
Free ammonia	.39	trace	trace
Albumenoid ammonia	.09	.85	.15
Nitrates	2.5	.4	trace

CHEMICAL RESULTS IN THEIR ORDER DOWN THE STREAM, 1897.

	Residues.	Chlorine.	Nitrogen.
Potomac, above Pulp Mills	66	10.8	.105
Effluent of Pulp Mills, two sewers	1,418	165.5	.136
Potomac, below Pulp Mills	278	10.8	.042
George's Greek at West Virginia bridge	1,782	14	.15
Potomac, half mile below George's Creek	2,018	13	.75
Potomac, at Cumberland intake	244	10.8	.19
Will's Creek, at West Virginia Rd. bridge	398	26	.53

Average composition of Potomac, above Pulp Mills, from four examinations.

Total residue	76
Chlorine	6.8
Nitrogen	.11

Average composition of Potomac water belon Pulp Mills, from four examinations.

Total residue	477.25
Chlorine	20.22
Nitrogen	0.17

Average of three examinations of George's creek water.

Total residue	1,618
Chlorine	11.16
Nitrogen	1.29

Average of three examinations of Cumberland water at the intake.

Total residue	319
Chlorine	8.58
Nitrogen	.549

Mr. Mitten, inspector, contributes the following notes, which were not obtained in time to be included in the report to the Council.

Castle Run flows into George's Creek at Lonaconing. On this stream are 27 privies and 12 pig-pens, all discharging into the Run.

On Douglas avenue, Lonaconing, is a 12-inch covered sewer receiving waste of 4 water closets.

Jackson run flows into George's creek. Twelve water closets, 4 pig-pens and the sewage from 25 houses empty into this run. On George's creek there are 25 privies and 6 slaugherhouses and 10 pig-pens.

Slaughterhouse of John Kinloch has a wooden trough discharging on bank of creek. Owner claims that nothing goes into creek but washings of the floor of the slaughterhouse. Feeds offal to hogs. Renders fat in open kettles. Burns bones.

Mr. Nelson claims to feed everything to hogs. Renders fat in open kettles.

Thomas E. Boston has a filthy slaughterhouse. All sorts of offal in the house. Everything runs into the creek. Renders fat in open kettles.

William H. Wilson discharges all blood and manure into the creek. Feeds offal to hogs. Renders fat in open kettles.

Mr. Brady throws blood and manure into the creek. Feeds hogs. Entrails in the creek at examination. Renders in open kettles.

Louis House throws blood and manure into creek. Keeps hogs. Renders in open kettles.

Troy laundry empties into George's creek, as do also the wastes from Consolidation Company's mines, George's Creek Coal and Iron Company, New Central Coal Company, Maryland Coal Company, American Coal Company.

Pekin; number of privies emptying into the creek not counted.

Barton, four miles from Lonaconing, is on Bartlett run, which empties into George's creek. Ohr's tannery empties into the run. Two slaughterhouses also discharge into the run.

Midland, two miles above Lonaconing, has two slaughterhouses emptying into Gerge's creek.

Westernport has twenty-eight privies on George's creek.

Piedmont has twenty-five privies and four hog-pens, which empty in the Potomac,

Moscow has seven privies visible from railroad.

Phœnix has five privies visible from railroad.

Franklin has five privies visible from the railroad.

The report was manifolded upon request of several newspapers. Copies intended for the Baltimore dailies were kept until Monday night, October 11th. The two copies for the Cumberland papers were mailed at 10.50 o'clock on Sunday night at the corner of North Avenue and Charles street. The Council met at 8 o'clock in the evening of Monday. I was much surprised to learn that

the Cumberland Evening Times printed the report in advance of the Council meeting. I immediately apologized to the Mayor and through him to the Council. He wrote me a most undignified letter to which I did not reply. I then wrote the Council a letter of apology, to which they returned a very courteous answer, accepting my letter as sufficient repair for the advance publication of the report. It is to be regretted that the report does not accord with the views of the City Council upon the pollution of Potomac river, but I have arranged to meet them on November 8th, at which time I hope we shall find some common ground of procedure.

October 13th, outbreaks of diphtheria were reported at Aberdeen and Perryman, Harford county. The information was referred to Dr. C. A. Hollingsworth of Belair.

October 16th, I went with Drs. McShane and Stokes to visit Chase Station and vicinity. At Chase Station we found one case of typhoid fever in the person of William F. League, whose father had died of intestinal hemorrhage during an attack of "typho-malarial fever." In a neighboring house a Miss Hughes had died of hemorrhage, also occurring in the course of "typho-malarial fever." At the house of Mr. Draayer were found three cases of typhoid fever, one of them exceedingly grave. Other cases of typhoid fever were found in the persons of Miss Mamie Sterling, Harry Harris, Harry Bramble, Miss Lizzie Jones. Samples of blood were taken in all these cases for the Vidal test.

John Myers, who had a clear case of pneumonia, was also subjected to the same test, in order to be sure that typhoid fever was not also present. In all the cases, save those of John Myers and John Draayer, the reaction characteristic of typhoid fever was obtained. John Draayer had been sick a day or two. He had a clear case of typhoid fever. Two deaths have since occurred—William League and George Draayer.

Samples of the drinking water were obtained, and the results of the examination will be reported by the chemist. The bacteriologist, Dr. Stokes, found bacillus coli in the spring of the Draayer family.

Dr. Purnell Sappington, Health Officer for Baltimore county, collected samples of blood on the day previous to our visit, and from independent observations reported the same bacteriological results.

On October 20th, an outbreak of diphtheria at Arbutus was referred to Dr. C. L. Mattefeldt. Dr. Mattefeldt's report was transmitted to Dr. McShane.

On October 22d, an outbreak of an unnamed eruptive fever was reported to me by Dr. Huntt, Health Officer of Laurel. A very warm controversy was in progress as to the nature of the disease, several of the local physicians maintaining the diagnosis

of scarlet fever. I advised Dr. Huntt to accept the diagnosis of the other physicians, and to execute such preventive measures as their representations would seem to warrant. I also ordered the schools closed until a diagnosis should be established.

On the 26th, the controversy continuing unabated, I visited Laurel. Dr. Huntt was absent, and I was unable to see his cases.

Being unwilling to see first the cases in the care of the other physicians, postively called scarlatina, I collected as much information as possible concerning the number of sick children and the nature of their illness, and reported to the local board of health that a serious outbreak of scarlet fever was in progress, and that another outbreak of an infectious disease of unknown nature was also present. I directed that measures of isolation and disinfection be enforced in all cases. Nothing further has been heard of the epidemic. No fatalities occurred.

This occurrence illustrates the feebleness of local boards of health as at present constituted. Underpaid health officials find their public and private interests in frequent conflict. General practitioners need not be expected to give hearty support to health officers who are at the same time competing for private business. Questions of diagnosis will not be approached without prejudice by a health officer who is called upon to review, for the benefit of the public, the cases which he has attended in private practice.

During the month I have sent out nearly one thousand inquiries concerning typhoid fever, scarlet fever and diphtheria. A clerk has been constantly engaged in addressing and mailing these inquiries, and in tabulating the returns. The inquiry is meeting somewhat better respone than last year.

On October 25th, I went with Dr. Sappington to Reisterstown to investigate an outbreak of diphtheria. The public school was closed upon the advice of local physicians. Two deaths had occurred, but the number of cases could not be ascertained. The public school building and premises were inspected and certain alterations advised.

October 27th, I attended the meeting of the American Public Health Association in Philadelphia, during three days. The meeting was largely attended and most successful. Maryland was represented by Dr. Geo. H. Rohe, Dr. John Morris, Dr. Jas. F. McShane and myself. I had an opportunity while there to visit the City Bacteriological Laboratory, which is in most respects a model institution, and to observe in detail the methods and management.

On October 30th, at the request of Dr. J. O. Bullock, Health Officer for Lonaconing, I issued a notice against a man in that town who had long and successfully resisted the local authorities

in the maintenance of a hog pen nuisance. The notice from the State Board of Health had the desired effect.

During the month I have been engaged in arranging the details of the semi-annual meeting of the Maryland Public Health Association to be held on November 18th and 19th. Several meetings have been held by the committees, and an attractive programme has been arranged.

November 7th, I went to Cumberland and met the City Council in executive session.

Nov. 11th, an outbreak of diphtheria at Bel Alton in Charles county, was reported by Dr. C. H. Posey.

On November 13th, an outbreak of diphtheria was reported at Fishing Creek, in Dorchester county, by Dr. William T. Henry. One death occurred. Dr. Henry sent me two cotton swabs bearing matter for infected throats. The diphtheria bacillus grew from one specimen, but not from the other.

On November 15th, fifteen cases of diphtheria were reported at Manchester, Carroll county. The attending physician, Dr. Sherman, reported obstinate opposition to his efforts to prevent the spread of the disease. The matter was referred to the Carroll County Board of Health.

On November 18th and 19th the semi-annual meeting of the Maryland Public Health Association was held in Baltimore. The attendance excelled that of February last, taxing the capacity of the hall on Thursday night and Friday afternoon. A full stenographic report of the meeting was made, and will be ready for publication in our biennial report. This Association has made a remarkable growth in its first year, and in such an organization the State Board of Health has a most intelligent and powerful ally. There are now about 400 members.

November 30th, three cases of scarlet fever were reported in Snow Hill, Worcester county. Worcester county has now no health officer. Instructions were sent to the County Commissioners and to the School Board, and I learn from Dr. Paul Jones that no new cases have yet appeared (December 6th.)

On December 7th, an outbreak of typhoid fever at Davidsonville, Anne Arundel county, was reported to the State Board of Health, and referred to Dr. J. M. Worthington, Health Officer for Anne Arundel county, who has since reported, and sent a number of waters for analysis.

On the same date, outbreaks of diphtheria reported at Westport and Mt. Winans, were referred to Dr. P. F. Sappington, Health Offier for Baltimore county.

JOHN S. FULTON, *Secretary.*

The Executive Committee, on October 14th, audited and ordered paid, bills to the amount of $494.53, as follows:

Salaries	$295 00
Secretary's expenses	30 55
Members' expenses	10 00
Inspector's expenses	57 00
Chemist's expenses	3 93
Typewriter's supplies	1 50
Stationery	20 25
Rent	75 00
Incidentals	1 30
	$494 53

The Executive Committee, on November 18th, audited and ordered paid, bills to the to amount of $409.05, as follows:

Salaries	$295 00
Secretary's expenses	54 77
Members' expenses	20 00
Inspector's expenses	15 85
Chemist's expenses	2 38
Stationery	9 75
Premium on bond	10 00
Incidentals	1 30
	$409 05

The Executive Committee, on December 9th, audited and ordered paid, bills to the amount of $375.73, as follows:

Salaries	$295 00
Secretary's expenses	4 00
Members' expenses	10 00
Inspector's expenses	28 20
Printing	13 50
Stationery	2 00
Telephone rental	21 23
Incidentals	1 80
	$375 73

SECRETAR'YS REPORT

AS

SUPERINTENDENT OF VITAL STATISTICS.

Section 7 of chapter 438, of the Acts of 1880, is as follows:

The Secretary shall be the Superintendent of Vital Statistics; he shall collect, tabulate and index these statistics, and cause the returns received by him for each annual and biennial period to be bound together in one volume, and after he has prepared from the returns such tabular results as will render them of practical utility, he shall deposit them in the State Library; and in order to secure uniformity and correctness, all State and county officers, local health authorities and other persons charged with collecting or recording marriages, births and deaths in the State, shall quarterly, on or before the first days of January, April, July and October, in each year, make true and correct returns to the said Superintendent of Vital Statistics, who shall have the same properly transcribed in books to be kept for the purpose, and shall, in the event of an unusual mortality, in any particular locality, make immediate inquiry into the same, and report the results thereof to the Board. For the duties imposed by this section, and to defray the necessary clerical and other expenses of his office, the Superintendent of Vital Statistics shall receive a sum not exceeding two hundred dollars in any one year, to be adjusted by the Board.

Pursuant to these instructions I beg to report as follows:

BALTIMORE.

The vital statistics of Baltimore are usually ready for publication about the first of February in each year. The returns for 1896 are shown in the following tables:

Estimated population, white			431,054
" " colored			75,344
Total			506,398
MARRIAGES, 4,534. Rate per 1,000 of population		8.96	
BIRTHS (reported), white males	3,762		
" " " females	3,733		
Total white		7,495	

Births (reported), colored males	633	
" " " females	666	
Total colored		1,299
Total males	4,395	
" females	4,399	
Grand total		8,794
Birth rate per 1,000, white population	17.38	
" " colored "	17.32	
" " whole "	17.37	
Still births		678

DEATHS.

Total mortality native white males	3,067	
" " " " females	2,845	
Total		5,912
Total mortality foreign white males	889	
" " " " females	811	
Total		1,700
Total mortality colorèd males	1,140	
" " " females	1,167	
Total		2,307
Total males	5,096	
" females	4,823	
Grand total		9,919
Annual death rate per 1,000, white population		17.66
" " " " colored "		30.76
" " " " whole "		19.60

NUMBER OF DEATHS DUE TO EACH OF 24 CAUSES.

Measles	27	Pneumonia	884
Scarlet fever	31	Bronchitis	253
Diphtheria	249	Influenza	60
Croup	32	Bright's disease	228
Whooping-cough	87	Cancer	344
Typhoid fever	188	Disease of heart	476
Typho-malarial fever	16	Sun and heat stroke	105
Diarrhoea	113	Pernicious anaemia	11
Dysentery	82	Appendicitis	25
Cholera infantum	412	Illuminating gas	13
Cholera morbus	22	Accidents	177
Consumption	1,122	Cerebro-spinal fever	32

DEATHS CONNECTED WITH PREGNANCY AND CHILD-BIRTH.

Puerperal fever	7
" convulsions	6
" peritonitis	20
" septicaemia	26
Child-birth	26
Abortion	2
Hemorrhage post-partum	2
" placenta praevia	4
Total	93

Infant Mortality.

Total mortality under five years of age		3,728
Percentage to total mortality	37.58	
Total mortality from diarrhoeal diseases under five years		526
" " " " all ages		981

Deaths in Public Institutions.

Baltimore City Jail	4
Penitentiary	17
Hospitals and asylums	1,124
Total	1,145
Deaths reported by coroners, including inquests	792
Total autopsies	80
Bodies received at City Morgue	346

V. BURGESS HINES,
Secretary Board of Health.

TABLE I.

Showing Number of Dwellings, Population, White and Colored Total Number of Deaths, and Death Rate per 1,000 in Each Ward for the Year 1896.

Wards.	Dwellings.	Population.			Total Number of Deaths.	Death Rate per 1,000 in Each Ward.
		White.	Colored.	Total.		
First	5,813	24,471	526	24,997	500	20.83
Second	2,511	16,169	390	16,559	466	29.12
Third	2,770	14,837	2,448	17,285	335	19.11
Fourth	2,821	13,836	2,665	16,501	294	18.37
Fifth	2,864	13,711	3,822	17,533	302	17.76
Sixth	8,811	28,631	3,792	32,423	824	25.75
Seventh	9,717	30,689	1,546	32,235	514	16.06
Eighth	6,318	23,668	2,827	26,495	516	19 86
Ninth	2,154	16,074	2,644	18,718	540	30.00
Tenth	2,654	13,505	4,268	17,773	300	17.64
Eleventh	3,821	10,797	12,701	23,498	478	20.78
Twelfth	7,198	22,332	4,910	27,242	602	22.29
Thirteenth	2,571	14,117	2,661	16,778	331	20.68
Fourteenth	3,402	16,471	2,801	19,272	408	21.26
Fifteenth	2,392	12,638	4,598	17,236	321	18.88
Sixteenth	2,533	11,344	5,057	16,401	242	15.12
Seventeenth	5,894	27,414	652	28,066	617	22.03
Eighteenth	6,796	26,155	3,805	29,960	607	20.93
Nineteenth	5,611	23,590	5,371	28,961	533	19.03
Twentieth	4,871	19,975	4,837	24,812	345	14.37
Twenty-first	6,725	21,658	768	22,426	328	14.90
Twenty-second	8.753	28,972	2,255	31.227	516	16.64
	107,000	431,054	75,344	506,398	9,919	19.60

TABLE II.

Deaths During the Year 1896 in Monthly Periods, and by Sex, Color and Nativity.

	Native White.			Foreign White.			White.			Colored.			Totals.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
January	265	261	526	80	55	135	345	316	661	96	91	187	441	407	848
February	268	239	507	95	86	181	363	325	688	104	125	229	467	450	917
March	213	184	397	51	65	116	264	249	513	102	88	190	366	337	703
April	251	242	493	66	82	148	317	324	641	121	95	216	438	419	857
May	186	197	383	53	63	116	239	260	499	64	95	159	303	355	658
June	190	181	371	52	44	96	242	225	467	83	97	180	325	322	647
July	452	358	810	85	66	151	537	424	961	127	141	268	664	565	1,229
August	300	280	580	88	73	161	388	353	741	94	87	181	482	440	922
September	238	227	465	68	59	127	306	286	592	95	80	175	401	366	767
October	266	258	524	93	79	172	359	337	696	95	88	183	454	425	879
November	178	181	359	65	58	123	243	239	482	73	79	152	316	318	634
December	260	237	497	93	81	174	353	318	671	86	101	187	439	419	858
	3,067	2,845	5,912	889	811	1,700	3,956	3,656	7,612	1,140	1,167	2,307	5,096	4,823	9,919

TABLE III.

Deaths in 1896 According to Age and by Months.

Ages.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.
Under 1 year	167	203	151	179	141	189	515	306	219	207	118	170	2,565
Between 1 and 2 years	62	66	44	42	36	24	98	77	55	55	34	40	633
" 2 " 5 "	57	60	36	49	44	36	50	27	27	56	46	42	530
Total under 5 years.	286	329	231	270	221	249	663	410	301	318	198	252	3,728
Between 5 and 10 years	26	31	23	26	29	21	19	11	22	25	20	23	276
" 10 " 15 "	17	12	7	12	13	14	14	19	12	17	6	14	157
" 15 " 20 "	27	31	25	22	17	14	24	29	22	32	21	31	295
" 20 " 30 "	82	79	62	67	67	36	88	71	79	68	59	73	831
" 30 " 40 "	72	83	55	76	54	55	72	70	65	75	64	87	828
" 40 " 50 "	72	71	66	62	53	55	74	78	64	69	57	83	804
" 50 " 60 "	83	71	70	80	58	65	90	66	60	91	55	92	881
" 60 " 70 "	76	98	75	120	67	73	96	66	52	82	65	88	958
" 70 " 80 "	71	85	56	81	54	41	69	73	63	66	61	71	791
" 80 " 90 "	29	25	29	35	23	22	16	24	23	33	27	37	323
" 90 " 100 "	6	2	3	6	1	2	3	5	4	3	1	6	42
" 100 " 110 "	1	......	......	......	1	......	1	......	......	......	....	1	4
Above 110 years	......	.....	1	......	......	.....	......	.....	.....	......	......	......	1
Totals	848	917	703	857	658	647	1,229	922	767	879	634	858	9,919

TABLE IV.

Deaths in 1896, According to Nativity and by Months.

Nativity.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.
United States—White males	265	268	213	251	186	190	452	300	238	266	178	260	3,067
" " females	261	239	184	242	197	181	358	280	227	258	181	237	2,845
Foreign—White males	80	95	51	66	53	52	85	88	68	93	65	93	889
" " females	55	86	65	82	63	44	66	73	59	79	58	81	811
Colored males	96	104	102	121	64	83	127	94	95	95	73	86	1,140
" females	91	125	88	95	95	97	141	87	80	88	79	101	1,167
Totals	848	917	703	857	658	647	1,229	922	767	879	634	858	9,919

TABLE V.

Still Births, Marriages and Births in 1896 by Months.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.
Still births	70	42	54	50	63	59	69	39	34	65	56	77	678
Marriages	327	287	298	287	346	458	423	384	384	423	503	414	4,534
Births reported	872	692	706	673	645	617	851	641	716	685	721	975	8,794

TABLE VI.

BIRTHS REPORTED IN 1896, ACCORDING TO SEX AND COLOR, AND BY MONTHS.

BIRTHS.	JANUARY.	FEBRUARY.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER.	NOVEMBER.	DECEMBER.	TOTALS.
White males	384	291	307	312	274	255	359	266	304	288	30	418	3,762
" females	366	285	299	268	282	249	360	278	305	293	321	427	3,733
Total	750	576	606	580	556	504	719	544	609	581	625	845	7,495
Colored males	65	57	49	41	37	57	63	50	41	53	45	72	633
" females	57	59	51	52	52	56	69	47	63	51	51	58	666
Total	122	116	100	93	89	113	132	97	107	104	96	130	1,299
Total births reported	872	692	706	673	645	617	851	641	716	685	721	975	8,794

VITAL STATISTICS OF THE COUNTIES

It has for some years been the practice of the State Board of Health to provide the practicing physicians of Maryland with printed postal cards for returns of births, deaths, and diseases. Of the large number sent out, but a trifling fraction came back to the State Board of Health, while of these returning few, only a moiety bore such information as was sought.

The returns made in 1895 are here printed, and an examination will show, even to the inexperienced, that they are both insignificant in their relation to the mortality of the State, and extremely unreliable as to the causes of mortality.

The returns for 1896, up to October, are also printed. They represent the reports made by thirty-two physicians of sixty-seven deaths. Looking over the list of physicians who made the returns for 1896, one observes that in this small group of thirty-two names the best medical men are associated with the worst. The number of absolutely unfit practitioners in Maryland is not large, but that small class shows up disproportionately in these reports. The quality of the general medical practice in this State, may not therefore be judged by the returns.

These tables illustrate the need of new legislation on the subject of Vital Statistics, and they show the wastefulness of inadequate appropriations. All the births, deaths and marriages in Maryland can be collected, recorded and tabulated at a cost of twelve cents for each name, and the permanent records would have great and increasing value. They would be constantly consulted, not only by health officers, but by court officials, lawyers, administrators, insurance companies, election officials, and all persons having interest in any issue concerning the facts or circumstances of births, death or marriage. On the other hand, the tables here published cost the State ninety-one cents for each item, and neither the totals nor any single record have any present or possible future value.

RETURNS OF BIRTHS AND DEATHS, IN 1895, FROM THE COUNTIES.

COUNTIES.	Births.	Vaccinations.	Deaths.	Scarlet fever.	Cerebro-spinal meningitis.	Diphtheria.	Whooping cough	Erysipelas.	Typhoid fever.	Malarial fever.	Diarrhoeal diseases.	Consumption.	Acute lung diseases.	Other zymotic diseases.	Dysentery.	Cerebral hemorrhage.	Acute enteritis.	Cancer of stomach.	Infantile diseases.	Softening of brain.	Heart disease.	Cause unknown.	Poisoning.	Debility.	Cerebritis.	Alcoholism.	Indigestion.	Bright's disease.	Arterio-sclerosis.	Croup.
Allegany	288	87	134	1	2	45	3	..	20	.	..	44	6	....	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	11
Anne Arundel	29	....	4	.	...	..	..	..	1	..	..	1	1	....	1	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..
Baltimore	110	292	15	1	...	4	..	..	5	..	..	2	3	....	..	....	..	..	..	..	..	..	..	..	..	..	..	.	..	..
Calvert	11	1	4	..	1	..	..	..	1	..	1	1	..	....	..	...	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Caroline	11	56	6	1	...	..	..	..	2	..	..	3	.	....	..	....	..	..	..	..	..	..	..	.	..	..	..	..	..	.
Carroll	44	40	12	1	..	3	.	3	2	..	..	2	..	...	..	....	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Cecil	362	585	65	..	....	..	..	..	9	2	17	21	5	3	6	....	..	..	..	..	..	..	1	..	..	1	..	..	..	.
Charles	19	48	14	..	...	1	1	..	2	..	1	6	2	...	1	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dorchester	20	31	6	..	....	..	..	.	..	.	..	3	1	....	1	...	.	..	..	..	..	..	1	..	.	..	..	..	..	..
Frederick	19	66	4	1	..	..	..	..	..	..	..	1	..	....	2	....	..	..	..	..	..	..	..	..	..	..	..	..	..	.
Garrett	12	..	3	..	..	..	1	..	..	..	..	..	..	....	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..
Harford	16	31	1	..	...	..	..	..	..	.	..	..	1	...	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Howard	12	31	6	..	.	.	..	..	1	..	3	1	1	...	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..
Kent	0	0	0	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..
Montgomery	15	3	5	..	.	.	.	..	1	.	..	..	1	...	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	.
Prince George's	23	294	6	..	....	..	..	..	..	1	3	2	..	....	..	....	..	..	..	..	..	.	..	..	..	..	..	..	..	..
Queen Anne	16	107	7	.	..	..	..	.	1	..	1	3	2	....	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..
St. Mary's	28	335	4	2	..	..	..	..	..	..	..	2	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Somerset	20	31	11	..	1	1	.	..	..	..	..	5	..	..	2	....	..	1	1	..	..	..	..	..	..	..	..	..	..	..
Talbot	21	0	4	1	...	..	..	..	3	..	..	..	..	...	..	...	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Washington	26	69	2	..	....	..	..	.	.	1	..	..	1	...	..	....	..	.	..	..	..	..	..	..	..	..	..	..	..	..
Wicomico	3	0	1	..	..	.	..	..	..	..	..	1	..	...	..	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Worcester	46	24	27	..	2	1	..	..	4	..	2	6	3	...	..	....	..	..	..	1	1	1	1	1	1	..	2	1	..	..
Totals	1145	2121	341	8	6	55	5	3	52	4	28	104	27	3	13	2	2	1	1	1	2	1	3	3	1	1	2	1	1	11

RETURNS OF BIRTHS AND DEATHS, IN 1896, FROM THE COUNTIES.

COUNTIES.	Births.	Vaccination.	Deaths.	Measles.	Cebro-spinal Meningitis.	Diphtheria.	Typhoid fever.	Diarrhoea diseases.	Consumption.	Acute lung diseases.	Other zymotic diseases.	Carcinoma of uterus.	Apoplexy.	Old age.	Bright's disease	Heart disease.	Pneumonia.	Tubercular Meningitis.	Cancer of stomach.
Allegany	26	2	2		1								1						
Anne Arundel	0	0	0																
Baltimore	32	28	9				1		3	4				1					
Calvert	2	5	0																
Caroline	9	0	4						3	1									
Carroll	6	4	0																
Cecil	7	14	1						1										
Charles	9	11	3							1					1	1			
Dorchester	10	19	8		1				4	3									
Frederick	3	2	4					1									1	1	1
Garrett	6	4	2		1		1												
Harford	2	5	0																
Howard	0	6	0																
Kent	0	0	0																
Montgomery	4	4	1		1														
Prince George's	92	15	11				1		6	2	2								
Queen Anne	2	1	0																
St. Mary's	16	48	9	2			6			2	3								
Somerset	26	1	5		1	2			1			1							
Talbot	2	2	2		1					1									
Washington	3	3	1						1										
Wicomico	14	46	4							3				1					
Worcester	2	0	1							1									
Totals	373	222	67	2	6	2	5	1	19	18	5	1	1	2	1	1	1	1	1

The postal card system of collection was abandoned by the Board in 1897. In December, inquiries were sent out to all local health officers for the statistics of their sanitary districts. Where no statistics were forthcoming, reasons were asked.

Below are such returns as have been made, with abstracts from the correspondence on the subject.

Anne Arundel County.

Dr. Jos. M. Worthington, Health Officer of Anne Arundel county, says:

"I regret to report that no returns have been made to me of deaths in the county during the past year."

Dr F. H. Thompson, Health Officer of Annapolis, says:

"There are no vital statistics of the city, no provision being made towards that end, nor requirement by city ordinance. It is to be hoped that the next Legislature will pass a mandatory law making physicians report such statistics, and even pay them for them so doing, which seems to be the greatest objection to said requirement."

Baltimore County.

Dr. Purnell F. Sappington, Health Officer of Baltimore county' says:

"I can report no vital statistics, other than report of deaths occurring in my own practice, and would prefer not reporting them, as no other physician in the county reports his deaths. There have been no executions in the county this year, and so I can report no deaths from the practice of others. Vital statistics are required of the Health Officer in the Election Laws of 1896, Chapter 202, Article 33, Section 12, but not in the Laws of Public Health, in force June 1, 1894. It is evidently taken for granted that dead men can sometimes vote.

"From the above, it is plain that the Health Officer of Baltimore county may make no report on vital statistics, as it is clearly not in his province."

Dr. C. L. Mattfeldt, Health Officer of Catonsville and vicinity, says:

"It is impossible for me to make an intelligent report on the health of my district, owing to absence of any means of procuring vital statistics, as physicians in Baltimore county are not required to report deaths, births or infectious diseases. The importance of enacting laws for compulsory reporting of above by physicians must be seen by every one. How otherwise are we to determine the health of any community, or how can the sanitary authorities be expected to successfully combat with epidemics?

"To the best of my knowledge, in the past year, we have had the following diseases:

"Typhoid fever, 19 cases, 3 deaths; scarlet fever, 6 cases, no deaths; Diphtheria, 2 cases, 1 death; Peritonitis, number unknown, epidemic; Whooping-cough, number unknown, epidemic; diarrhoeal disease, number unknown."

Dr. Edward Janney, Health Officer for Highlandtown, has made no communication to the State Board of Health upon this or any other subject.

Carroll County.

Dr. James H. Billingslea, Health Officer of Carroll county:

"We have really made no effort to collect vital statistics. In the county it would be a work requiring a great amount of time and considerable expense. The funds placed at the disposal of the health officer of the county, is inconsiderable for any such work."

Charles County.

Dr. Cataldus H. Posey, Health Officer of Charles county, says:

"I am unable to report vital statistics, for the reason that I have been unable to get a report from physicians practicing in different sections of the county, nor have I had any report of contagious of infectious diseases, with a few exceptions."

Cecil County.

Dr. Howard Bratton, Health Officer of Cecil county, says:

"There seems to be nobody particularly charged with the collection of vital statistics, and I am, therefore, unable to make any returns in this respect."

Calvert County.

Dr. Thos. M. Chaney, Health Officer of Calvert county, says:

"No returns whatever are made of the births in the county: of the deaths, only those caused by contagious diseases are reported. The lack of vital statistics is, I believe, owing to defects in the law upon the subject."

Caroline County.

Dr. Fred. R. Malone, Health Officer for Caroline county, made no reply.

Dorchester County.

Dr. Geo. P. Jones, Health Officer for Dorchester county, made no reply.

FREDERICK CITY.

DR. S. S. MAYNARD, *Health Officer.*

Record of Deaths from August 1, 1896, to July 31, 1897, by months.

DISEASE.	1896.					1897.							TOTALS.
	Aug.	Sept.	Oct.	Nov.	Dec.	Jany.	Feb.	March.	April.	May.	June.	July.	
Apoplexy	1								1		1		3
Angina Pectoris	1				1								2
Adenitis									1				1
Asthema						1							1
Anemia (Pernicious)								1					1
Bright's Disease	1							2			2		5
Bronchitis (Capillary)						3				1			4
Burn												1	1
Cancer (Uterine)				1									1
Cancer of rectum								1					1
Cancer of stomach					1						1		2
Cancer of liver		1											1
Cancer of Oesophagus		1											1
Cholera Infantum	1											4	5
Consumption of Lungs	2			1	5	3	1	1	1			2	16
Congestion of Lungs					1	1							2
Convulsions	1	2	3	2		1							9
Croup, Membraneous				1			1						2
Cirrhosis of Liver					1								1
Cystitis (chronic)											1		1
Diphtheria						1							1
Entero Colitis	1							1			1	1	4
Embolism (Cerebral)									1				1
Endocarditis, Rheumatic							1	1					2
Fever, Typhoid	2	1		1									4
Fracture of Femur		1				1							2
Heart Disease	1	3	1	2	3	1	1	2	2			1	17
Hemorrhage Cerebral			1										1
Inanition												2	2
Intestinal Obstruction	1												1
Indigestion, Acute						1					1		2
LaGrippe								3	1			1	5
Lymphadenitis			1										1
Marasmus					1					1		1	3
Meningitis (Cerebral)				1			1			1		1	4
Meningitis (Purulent)		1											1
Meningitis (Tubercular			1	1	1								3
Mumps						1							1
Myelitis				1									1
Paralysis				3	2				1	2	1	2	11
Paralysis of Heart									1				1
Pertussis							1						1
Premature Birth				1								1	2
Pneumonia			1	1	2	4	3		1	1			13
Patulent Foramen Ovale	1												1
Railroad injury	1							1	2				4
Still born	1		2	1	1	2	1			2	1	2	13
Suicide									1				1
Trismus Nascentium		1									1		2
Tabes Mesenterica	1		1									1	3
Ulcer, Gastric												1	1
Unknown											1		1
Old age	2			2			1			1	1		7

Frederick City—continued.

	1896.					1897.							
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Totals.
Died under 5 years.	8	3	9	6	5	10	4	1	2	6	5	13	72
Died between 5 and 20 years.	1	1	1	1	..	..	1	..	..	..	..	2	7
Died between 20 and 40 years.	1	..	..	1	2	2	3	2	1	..	2	..	14
Died between 40 and 60 years.	4	1	..	3	5	1	1	4	4	1	3	2	29
Died between 60 and 80 years.	2	5	1	5	6	6	2	5	6	1	2	3	44
Died over 80 and 90 years.	2	1	..	3	1	1	..	1	..	1	..	1	11
Deaths, white.	14	5	7	13	12	12	4	10	12	7	7	13	116
Deaths, colored.	4	6	4	6	7	8	7	3	1	2	5	8	61
Total.	18	11	11	19	19	20	11	13	13	9	12	21	177
Number of interments, (including those who have died elsewhere and were buried here).	20	17	20	25	22	29	23	17	19	13	15	25	245

Frederick County.

No returns.

Garrett County.

No returns.

Harford County.

Dr. C. A. Hollingsworth, Health Officer for Harford county, made no reply.

Howard County.

Dr. Thomas B. Owings, Health Officer for Howard county, says:

"I have no Vital Statistics to send you, as I have had no deaths in the last ninety days. I have had, thus far, 23 cases of typhoid fever."

Kent County.

Dr. James W. Urie, Health Officer of Kent county, says:

"You have received from me every case of contagious disease that has been reported, also the deaths, so far as I have known. The Law is so ineffective in regard to the Vital Statistics, that it is impossible for me to make a correct report.".

Montgomery County.

Dr. William L. Lewis, Health Officer of Kensington, says: "I am able only to furnish Statistics from my own practice."

Births—White, 29; Colord, 8. Total 37.

	White.	Colored.	Total.
Typhoid cases..............	8	10	18
Deaths....................	3	0	3
Scarlet fever...............	1	0	1
Deaths....................	0	0	0
Tuberculosis................	..	..	..
Deaths....................	1	1	2

Prince George's County.

Dr W. H. Gibbons, Health Officer of Prince George's county, says:

"I have no returns of Vital Statistics, because none have been received from others, nor have any myself; I did not know there was such a law."

Dr. J. R. Huntt, Health Officer of Laurel, says:

"We regret it is impossible to furnish a report of Vital Statistics. The lack of interest shown by the medical fraternity and the incompleteness of the State law account for our failure. Our city law is not enforced, simply because we are handicapped by the lack of a compulsory State law. So long as this continues, how can Maryland ever compare favorably with other States, and how can her healthfulness ever become known?"

Queen Anne's County.

No returns.

St. Mary's County.

Dr. L. B. Johnson, Health Officer of St. Mary's county, says:

"I am sorry that it is impossible to make any returns of vital statistics for the year. An effort has been made to collect such statistics from the physicians, but failed. Burial and death certificates are not required in this county. If a person dies, all that is necessary is to get some one to bury him.

"I have had inquiries by life insurance companies of deaths in this county, and have found it impossible to get any information. I was called upon once, to write a death certificate for a woman who had been dead for several months. I made an investigation and found that no physician had been in attendance, nor was there any person present when the death occurred. I was satisfied, though, that the woman died from natural causes, and so made a statement to the insurance company, but the money was not paid."

Somerset County.

No Health Officer. No returns.

Queen Anne's County.

No returns.

Talbot County.

No returns.

Washington County.

J. McPherson Scott, Health Officer of Washington county, says:

"In my hurry to send you my report, I neglected to explain the absence of returns of Vital Statistics. There are no returns of Vital Statistics in this county, no provision having been made for securing them."

Wicomico County.

Dr. C. R. Truitt, Health Officer of Wicomico county, says:

	Cases.	Deaths.
Diphtheria	14	......
Typho Malarial	112	2
Measles	11	......
Scarlet Fever	12	1
Typhoid Fever	35	2

The above cases collected from the doctors of the county since January 1st, 1897.

Worcester County.

Dr. J. B. R. Purnell, Health Officer.

Mortality per 1,000 of population from March 16, 1896 to March 15, 1897, inclusive.

Worcester county, 13.1. Snow Hill, the county town, 12.8. Pocomoke City, 12.5.

Ocean City—Two deaths for permanent population of about 320; or five-eights of 1 per cent., a very low rate—equivalent to 6.25 per 1,000.

INQUIRY CONCERNING TYPHOID FEVER IN MARYLAND.

In December, 1896, the State Board of Health, realizing the futility of attempts to obtain the vital statistics of this State by means of an appropriation of $200, determined to apply the funds to one special inquiry, in the hope that at least some profit might be returned upon the investment. Accordingly, an experimental circular was addressed to all the local health officers and to a considerable number of physicians in Baltimore City, inquiring as to the then prevalence of typhoid fever, diphtheria and scarlet fever. Most of the physicians addressed sent replies within ten days.

The following inquiry was then addressed to all the physicians in Maryland, outside of Baltimore city (over 900):

How many cases of typhoid fever are now in your care?

How many cases of typhoid fever have you attended this season?

How many deaths from typhoid fever do you know to have occurred in your county this season?

What observations have you made as to the cause of typhoid fever in particular cases or in groups of cases?

How many cases of diphtheria have you seen since the schools opened?

Have you used diphtheria antitoxin?

How many cases of scarlet fever have you seen since the schools opened?

The results justify the outlay, for they indicate that typhoid fever is more prevalent in Maryland than we have hitherto had reason to believe. One-third of the physicians addressed report in 1896, 1,171 cases of typhoid fever, with 218 deaths. In 1897, 329 physicians report 1,214 cases, with 222 deaths.

The inquiry was so worded as to obtain information of deaths known to the reporter, whether in his practice or not. When deaths were reported which did not occur under the care of the reporter, another inquiry was sent for particular information. It was found that physicians who answered the first letter also very cheerfully replied to the second. In this way it was possible to eliminate repeats from the list of deaths, and the figures as far as they go are believed to be correct.

COUNTIES.	Cases of typhoid fever.	Deaths from typhoid fever.	Cases of diphtheria.	Cases of scarlet fever.	Replies received.	Inquiries addressed.
Allegany	198	44	99	161	23	51
Anne Arundel	57	25	6	48	17	48
Baltimore	79	15	11	17	18	89
Calvert	58	7	2	0	10	14
Caroline	45	2	1	11	6	16
Carroll	53	8	41	84	15	38
Cecil	57	10	17	2	16	28
Charles	35	6	10	3	10	21
Dorchester	9	4	3	3	5	20
Frederick	47	10	45	37	15	56
Garrett	28	2	5	7	4	10
Harford	43	6	5	4	12	41
Howard	93	6	5	4	12	41
Kent	6	6	1	0	3	13
Montgomery	67	17	28	14	16	44
Prince George's	50	10	6	10	17	41
Queen Anne	24	3	0	7	4	23
St. Mary's	27	4	3	0	1	13
Somerset	33	8	0	0	7	14
Talbot	53	10	8	27	8	21
Washington	64	3	24	14	21	51
Wicomico	4	0	3	1	4	18
Worcester	32	10	39	9	9	26
Totals	1171	218	362	432	249	737*
1897						
Allegany	148	19	115	12	26	48
Anne Arundel	60	6	3	1	22	48
Baltimore	125	15	101	37	43	75
Calvert	18	3	0	0	9	12
Caroline	56	6	0	4	8	15
Carroll	63	12	6	6	14	36
Cecil	26	5	12	33	18	33
Charles	26	4	2	0	9	19
Dorchester	29	3	2	0	8	18
Frederick	62	12	6	16	21	57
Garrett	13	1	0	0	6	13
Harford	63	6	41	14	19	46
Howard	88	18	11	12	14	23
Kent	33	15	6	2	6	13
Montgomery	52	14	6	2	21	43
Prince George's	59	5	7	7	23	41
Queen Anne	19	5	0	21	11	21
St. Mary's	40	4	14	0	4	15
Somerset	1	1	0	0	14	13
Talbot	40	4	0	9	9	24
Washington	46	13	59	59	22	56
Wicomico	56	9	2	2	10	15
Worcester	81	30	4	2	12	21
Totals	1214	222	403	241	329	745†

*The number of inquiries sent was 875. Deaths, removals, and partnerships cancelled the list down to the figures shown.

†The number of inquiries was above 900. Corrections of the mailing list and clerical omissions, reduce the total number of which we have record to 745.

It seems clear that the typhoid mortality for this State, outside of Baltimore city, is about three times that of the city. The average of the two years gives us 220 deaths from typhoid fever reported by 289 physicians. The 1,100 physicians of Baltimore city, under compulsion of law, report the same number.

If the physicians who replied to our inquiries, have no more than their share of practice, we are justified in the assumption that full returns would have given us 3,578 cases, with 660 deaths for each year. This equals a mortality of 12.2 per 10,000 living, and such a death rate charged to a preventable disease, is a disgrace to the State. Adding the losses of Baltimore, these figures indicate that Maryland loses yearly 880 persons from typhoid fever. But this does not tell the whole story.

Many physicians, both in and out of Baltimore, still report cases of typho-malarial fever, a disease which does not exist in Maryland, and has not been proven to exist anywhere. Nearly all of these cases are typhoid fever, and the deaths should be charged to typhoid fever. Malarial fever is reported as the cause of another considerable number of deaths. In this latitude, deaths from malarial fever are rare, and many, perhaps the majority of these reports of death, point to error in diagnosis, typhoid fever having been the real cause of death.

Entero-colitis figures largely in the death returns of Baltimore city. The records of the hospitals, where the diarrhœal diseases are most carefully studied in the clinical and pathological laboratories, show that entero-colitis does not prevail to one-half the extent indicated by the mortality returns. Typhoid fever is very probably responsible for one-third the deaths charged to entero-colitis, the other two-thirds being divided among the varieties of dysentery and non-specific bowel diseases.

Diarrhœa and dysentery are charged with a large number of deaths. Used to indicate the cause of a death, diarrhœa is an exceedingly vague term, expressing not a disease, but a symptom. Our views concerning dysentery are undergoing a radical modification, and it seems likely that the term will presently include two or three specific diseases and some non-specific affections, very few of which are at present capable of accurate diagnosis. Among adults, deaths from the ordinary fermentative catarrhal bowel diseases is rare, while the returns of Baltimore city charge a large number of deaths to such causes. Perhaps one-fourth of these deaths are due to masked typhoid fever.

The same thing may be said of gastro-enteritis and of the "gastric fever" and of the "simple continued fever" so frequently reported.

"Typhoid pneumonia" is either true pneumonia of a dynamic type, or is typhoid fever disguised by a pulmonary localization. The same compound word is sometimes used to signify the occurrence of pneumonia late in the course of typhoid fever.

A great many, perhaps the majority, of the typhoid pneumonia deaths should appear in the typhoid column.

If we add to the mortality of Baltimore for 1896, but one-fifth the deaths ascribed to these vague diseases, we should obtain a death roll of 280 persons, and supposing the same erroneous views of pathology to be equally prevalent outside Baltimore city, the mortality for the State in 1896 was, upon the same basis, 1,241 persons.

One may escape such a conclusion, by assuming that the few physicians who have reported to us do all the practice, or by upholding obsolescent pathology, or by refusing to reason upon the data.

The whole inquiry was of very great interest to the State Board of Health, and must have been interesting to many physicians, for the number of most earnest letters received and the amount of correspondence invited were far greater than the secretary could handle. Evidently there are some two hundred physicians outside Baltimore who, if they do not know how much typhoid fever there is in Maryland, at least realize that it prevails to a deplorable extent.

These statements do not indicate the belief on the part of the State Board of Health that typhoid fever is a worse scourge in Maryland than in surrounding States. If it could be demonstrated that we are much less afflicted than our neighbors, the State Board of Health would still display the typhoid-fever rate as the truest measure of our sanitary shame. The experience of older communities, formerly more heavily taxed by typhoid fever than we are, shows that Baltimore city can depress her death-rate to one per 10,000, and that for the State a typhoid mortality of 3 per 10,000 is attainable.

REPORTS OF LOCAL HEALTH OFFICERS.

Allegany County.

Dr. Charles H. Brace, Health Officer. No report.

Dr. F. W. Fochtman, Health Officer, Cumberland. No report.

Lonaconing Board of Health,
James O. Bullock, M. D., *Secretary.*

December 8, 1897.

I have the honor to present herewith a synopsis of the work done by the Lonaconing Board of Health :

There were no statistics or records kept in this community of 6,000 population till since May last, when our health and sanitary ordinance was enacted. During the past six months there have been reported twenty-two cases of diphtheria with two deaths;

seventeen cases of typhoid fever with three deaths; eight cases of scarlet fever with one death; one case of membranous croup which terminated fatally. Most of the cases of diphtheria have been mild, but in one family there were four cases of a malignant type with two deaths. There has been one death from pulmonary tuberculosis, and there are two cases of that disease under treatment. From all causes we have had twenty-five deaths during the past six months.

Eighty inspections have been made and fifty-nine nuisances of various kinds ordered abated. Of all the nuisances coming to the knowledge of the Board, the pig-pens have been the most unsatisfactory to deal with. Many of the pens have only one apartment, and it is impossible to keep them clean, or to keep down the noxious and offensive odors.

The six slaughterhouses have been frequently inspected, also the several milk dairies that supply the town with milk and cream. The quality of milk averages about ten per cent. better than that of the best grazing districts. This is due to the fact, that the cows are fed on highly nutritious food, as cornmeal, shorts and sheaf oats.

The importance of having an organized local Health Board was shown soon after the enactment of the health ordinance.

During the month of June complaints were made to the secretary about the unpleasant taste and offensive odor of the water, supplied by the Lonaconing Water Company. Upon investigation it was found that a quantity of mud, leaves and other vegetable matter, brought down stream by the spring freshets had been deposited upon the bottom of the reservoir. This, in the warm sun, was undergoing decomposition and rendering the water unfit for use. A sample of the water was sent to the State Board of Health for analysis. The City Council was advised to ask the water company to drain the reservoir and clean the bottom. Also to build another dam above the present site to keep the leaves and vegetable matter from reaching the reservoir.

The chemist's analysis of the water was received. The report of Dr. Fulton, secretary of the State Board of Health, upon the analysis confirmed the statement of the local board as to the cause of the bad character of the water. The water company was glad to act, and found, after draining the reservoir, from two to four feet of sour and offensive debris at the bottom.

As to statistics, we have no registration of births. Indeed we could only compel something of that kind in corporate limits which are so small that it would amount to but little. I would be glad to see enacted a much more stringent State Health Law by the coming Legislature. It should provide for a general registration of births and deaths. I would have a local health officer at every place where there is one or more resident physicians,

with the jurisdiction extending as far as the medical practice from that place. The health officer should have the right to make complaint to the nearest magistrate against those who failed to comply with notice to abate nuisances. The magistrate should have power to impose fines the same as may be done within corporate limits.

As a sanitary officer one comes to see things in a new light. We are just finding out that our worst ills may be classed as "preventable diseases." In the past we have given our energies to the curing of disease; in the future we must strive to suppress the causes which produce disease.

Anne Arundel County.

Dr. J. M. Worthington, Health Officer. Report upon Vital Statistics only.

Dr. Frank H. Thompson, Health Officer.

Annapolis, Md., December 12, 1897.

As regards the health of our city for the past year, it has been exceptionally healthy, the prevalence of contagious diseases being at a minimum. I have had reported to me officially during the year, four cases of scarlet fever in three families, all in the charge of careful physicians, and all necessary precautions taken. At this moment I know of no cases. I do not think that there has been a case of diphtheria in the city for the past twelve months. Had there been I probably would have heard or been made aware of it. It would be possible to get the mortality statistics of the city by applying to the various cemetery superintendents. Our death-rate for the past seven years has not exceeded 15 per thousand of the population.

Baltimore County.

Dr. Purnell F. Sappington, Health Officer.

December 1, 1897.

The preservation of the health of the county being the object for which the health officer is appointed, he takes pleasure in submitting his report, to show what has been done to further such results, and what still remains to be done.

Directly after my appointment, the mails brought me daily complaints from the different sections of the county, and all imaginable nuisances were brought to notice, some of which were amenable to the State laws of health, others, for their abatement, requiring an injunction.

Since my appointment the following work has been done, and numbers of complaints investigated:

Number of complaints	90
Wells inspected	18
Cause of complaint:	
Typhoid fever in neighborhood	4
Bad odor	10
Due to contamination with animal matter from cess-pool, privy, pig-pen, or manure pit:	
Cess-pools, from which wells were contaminated	4
Cess-pools	13
Privies	29
Defective drainage, streams, ditches	2
Gutters	7
Stables	4
Pig-pens	6
Factories, emanations due to process of manufacture.	1
Typhoid fever	11
Diphtheria	7
Night soil used as fertilizer and not covered with soil	1
Grave yards	1
Unburied carcases	2

One of the most pernicious causes of complaint is the cess-pool nuisance. All cess-pools are evils, the deeper the worse; yet there is no law by which they can be abolished. This applies with special force to the thickly populated portions, and that part of the county contiguous to the city which pays the major portion of taxes.

Pure air, pure water, pure soil, were advocated by Hippocrates as essential to health. We have in this county in some localities the exact opposite—impure air, water and soil.

We might pray, "Give us this day our daily bread and deliver us from the cess-pools" with all reverence and earnestness.

The water of the county is very good and the supply plentiful. The samples which have been found impure, have come from wells fouled by cess-pools, privies, pig-pens or manure pits. The privies of the county are generally badly kept. Some are constructed on banks and are never cleaned. The rains and melting snow are expected to do the labor of the scavenger. The defective drainage is a crying menace, and large pools of household slops are allowed to lie in the sun and send forth their pestilential odors Gutters and ditches are allowed to become clogged with debris, and in some places they no longer act as drains but as dams. Stables are generally kept in a fair condition, so far as the interior is concerned, but the surroundings are frightful at times.

The factories I have looked into are generally well kept, and the one referred to has had the best attention its owner could give, he doing all he could and can to correct the complaint.

The depth of graves should be regulated, so that the odors of decomposition may not molest those living near by; drainage from the graves should be required.

Dead animals are frequently carried into the woods and left unburied. The laws on the subject are apparently not known. Infectious and contagious diseases are not reported as they should be, and I was greatly surprised at a recent meeting of the medical men of the county to hear how many cases were in the county that had not been reported to the proper authorities. This reflects little credit upon our county physicians, and really encourages the light esteem held by its residents, of the importance of notification. Failure to report such cases is punishable by a fine of $50. The institutions of the county which I have visited have been in a clean and healthy condition, but some of the engine-houses have defective drains, and the manure piles are offensive.

It is with great pleasure that I learn that the county commissioners have granted to the city the right to lay water mains in the portion of the county near the city. This is a step in the right direction and of much significance from a health standpoint. The duties of the office are such that, to attend to them properly, will certainly entitle one to an increase of salary. Investigating the ninety cases reported, 126 visits were necessary, and these visits alone, not counting office work, required 434 hours—a little less than three and one-half hours for each investigation.

DR. C. L. MATTFELDT, Health Officer,

CATONSVILLE, December 8, 1897.

In addition to remarks upon vital statistics, Dr. Mattfeldt says: "The causes of typhoid in this community I attribute to the pernicious system of living well cess-pits in use here and the continued use of well water. I have examined fifty-one nuisances and had same abated. I have also vaccinated eighty-four children.

I also investigated epidemic of scarlet fever at Oella, about three miles from here, and found over fifty cases; and to still further emphasize the importance of reporting contagious diseases would state that had the first few cases been reported this number would have been greatly reduced, as no new case developed after the proper sanitary precautions had been used.

The sewerage of Catonsville is very bad and needs immediate attention.

The public school is also in an unsanitary condition and souree of much sickness owing to faulty construction, and being overcrowded—in one room there being only eighty-three cubic feet of air space for each pupil, whereas there should be at least 175 cubic feet. With these exceptions the sanitary condition of my district is very good."

Dr. E. W. Janney, Health Officer, Highlandtown. No report.

Caroline County.

Dr. Fred R. Malone, Health Officer. No report.

Calvert County.

Dr. T. M. Chaney, Health Officer, December 8, 1897.

The Board of Health of this county was not organized until 18th of last May.

For the period extending from that date to this I, as Secretary of the Board, make the following report:

During the summer and fall, malarial diseases have been prevalent but mild in character. There has been one case of, but no death from, a contagious disease.

No returns whatever are made of the births in the county. Of the deaths only those caused by contagious diseases are reported. This lack of vital statistics is, I believe, owing to the defects in the law upon this subject.

From the fact that the physicians, without exception, and the people generally of the county, have supported the Board of Health in their efforts to prevent diseases, I think they will cheerfully give any reasonable service in making such returns as will secure reliable statistics. In my opinion the law should require returns to be made to the local Board of Health, and these Boards should have anthority to enforce the law.

Carroll County.

Dr. J. Howell Billingslea, Health Officer, December 9th,

It gives me great pleasure to state that the health of our county, Carroll, for the year ending December 1, 1897, has been exceptionally good. It is true we have had some typhoid fever, scarlet fever, measles, whooping cough and diphtheria. Fortunately the malady has been very light.

We have had what is rare for this county, cases of typhoid fever coming as late as November. Usually our cases occur during the late summer and early fall months.

We have really made no effort to collect vital statistics. In the the county it would be a work requiring a great amount of time and considerable expense. The funds placed at the disposal of the health officer for the county is inconsiderable for any such work. The distance from one extreme of our county to another, is twenty-four to thirty-five miles. Our people are certainly more alive to sanitary matters of late, due largely to the visit of the health board to our county towns in the past summer.

I wish to state that my connection with the health board of our county ceased December 1st, 1897. Dr. John S. Mathias, of Westminster, has been appointed as my successor.

Charles County.

Dr. Cataldus H. Posey, Health Officer, December 11, 1897.

From my own observation and from information gathered from the most reliable sources possible to get, the county seems to be in a fairly healthy condition, with the exception of an outbreak of diphtheria, which appeared in a colored family in the neighborhood of Cox Station, on the B. & P. R. R., on or about the 10th day of October, last. The family, consisting of father, mother and three children, all were taken, one after the other, with the disease; all recovered, but one, a child about seven years of age. Strict isolation, quarantine and antiseptic precautions were taken in these cases. No public funeral was allowed after death of the child, and thorough disinfection of the house and contents, using formaldehyde gas with generator, provided by our local board of health, as suggested by you. Since then other cases have appeared in the same section of the county, about twenty cases in all, with three deaths; same precaution as to isolation, &c., have been taken in every case as far as was possible, with the result, I think, and hope, of pretty well stamping out the disease, as no new cases have developed, to my knowledge, since the 20th of November, last.

There have been some few cases of typhoid fever, scattered over various sections of the county, and some deaths, but how many cases and deaths, I am unable to say, because of receiving no reports from physicians in different sections of the county.

It seems to me that physicians should be required to make a report to the health officers in the various counties or to the local health boards, under a penalty, and to be paid for their expense and trouble. I regret not to be able to make a thorough and reliable report, but under the circumstances and for the reasons I have cited I am unable to do so.

Cecil County.

Dr. Howard Bratton, Health Officer, December 10, 1897.

During the past six months there has been in Cecil county no "unusual" sickness or mortality—that is to say, "unusual" from a Cecil county standpoint.

The usual in this section is far beyond reasonable limits in morbidity and mortality, and it is just possible that some little interest has been awakened.

Fully 50 per cent. of the deaths are preventable; and while they are rather low in proportion to the number of cases of sickness, if the death rate over different districts could be shown by statistical evidence, it would be startling, to say the least.

The Town Councils lay claim to special Health Departments. The ordinances of the towns throughout the county are practically the same. According to them, a nuisance must "become offensive to the neighborhood" before any means for its suppression become operative. They are radically defective in that they do not contemplate primary prevention; and it is a debatable question whether these ordinances (formulated a half century ago) were not enacted for the purpose of getting rid of nuisances so far solely as odor is concerned, and that the menace to health was either overlooked or unknown.

This sort of local legislation through damnable sources of contagions which it fosters, not only accounts for many a death, but is stuck up as a barrier to any efficient health measures.

Although there has been no epidemic, so called, infectious diseases are rife, and deaths therefrom frequent. Twenty preventable deaths in a town strung out over a year attract no attention, and under existing customs and laws, unless they all occur in a bunch, there is practically nothing for the health officer to do but to notify the people of the losses they are suffering and the risks they are running, and prepare himself for personal encounters and suits for slander.

Dorchester County.

Dr. Geo. P. Jones, Health Office. No report.

Frederick County.

Dr. W. H. Baltzell, Health Officer. No report.

Frederick City.

Dr. S. S. Maynard, Health Officer. Full report on vital statistics.

Garrett County.

No report.

Harford County.

DR. C. A. HOLLINGSWORTH, Health Officer. No report.
DR. J. H. KENNEDY, Health Officer, Aberdeen. No report.

Howard County.

DR. THOS. B. OWINGS, Health Officer.

December 8th, 1897.

In making my report would say, that in 1896 we had a great deal of whooping-cough and measles during the winter and spring, and as the warm weather set in the usual diseases attendant upon the heated term. Dysentery, no doubt as the result of the drought and low condition of the water, and in the fall, typhoid and malaria followed.

In the twenty-three cases of typhoid fever I treated, I think the causes were discovered, and in no instance was there a new case. Considerable work was done in investigating causes of fever and improving the sanitary condition of places in the county. I have already given the result of the investigation as to the causes at the meeting of the health conference.

During 1897 there has been a great deal of scarlet fever. In one vicinity I was called to see the first case that occurred, and I notified the teacher of the school at which the child was a pupil, and had the teacher carried out my instructions it would have been stamped out then and there. But the teacher allowed other pupils from the same house to attend school, and the result was the inoculation of the whole school, and about twenty cases of this dread disease occurred.

At Sykesville this fall three cases of a very malignant type occurred, all three dying inside of forty-eight hours. I was notified and had the bed clothing burned and the premises fumigated. Two or three cases occurred, but the physicians attending acted promptly in isolating and quarantining them, and I hope there will be no further trouble. Should there be further infection among the school children I will recommend the closing of the school.

There were a number of cases at Alberton, and the physicians recommended the closing of the school. There was very little further trouble. I was requested by Dr. Eareckson to visit a house near Elkridge, where there had been six cases of diphtheria and one death, (the disease brought from Baltimore,) to have the place fumigated, which I compelled the parents to have done. There has as yet been no other case.

There has been a great deal of typhoid fever in the county this season, and there are some cases now. In my own practice there have been twenty-three cases, no deaths. In every instance

I have had the water analyzed, and the whole premises examined, and think there is no doubt that the foul water was the cause.

I have visited a number of localities in the county to investigate the causes of fever, and on one trip was accompanied by Dr. Fulton. An analysis of the water used for drinking and cooking, showed the existence of impure wells and springs. I am happy to say that a few cases of fever in our town, (Ellicott City,) have had a wholesome effect in causing the inhabitants to abandon the use of the foul water of the wells.

In one instance, at Lisbon, I have had a good deal of trouble with a slaughterhouse, continuing for three years. This fall I had the owner indicted. At the trial the several physicians of the neighborhood testified that the condition of the premises was not detrimental to health, and one doctor stated that a shovel full of lime thrown on once a week would render it advantageous to the health of the community. The jury acquitted him; the judge reprimanded him, and advised the place cleaned. Sixty days have passed and it grows worse. This matter I shall be compelled to turn over to the State Board of Health, hoping they will be able to accomplish what I have failed to do.

At Elkridge I have had the place cleaned and purified. As a result, fewer cases of fever than usual have occurred, until recently—there now being five cases in the place. I hope that you may be able at the coming Legislature to procure additional legislation for the Health Department.

Kent County.

Dr. Jas. W. Urie, Health Officer.

December 8th, 1897.

You have received from me every case of contagious disease that has been reported, also the deaths so far as I have known.

The law is so inefficient in regards to the vital statistics that it is impossible for me to make a correct report.

Annually there are many diseases in the county that are epidemics. Chief among them is typhoid fever, and invariably it is caused from impure drinking water. I know of no effectual remedy that will stamp out the dreaded disease, as it would be nearly impossible to have the water in all the wells tested to see that the water is pure enough for drinking purposes.

Montgomery County.

Dr. C. J. Maddox, Health Officer.

Montgomery county continues to enjoy the reputation for being one of the healthiest counties in the State, no diseases having prevailed incident to the climate during the present year.

Diphtheria prevailed in the neighborhood of Norbeck, situated on the Brookeville Pike. It broke out in a colored school, and many children were attacked, but the disorder being of a mild type, there were but two deaths. It was confined principally to the blacks. Antitoxin was not used.

Many cases of typhoid fever I visited at Rockville and vicinity. In my opinion the disease was produced by the low state of the water supply and its impure condition, together with the digging up the streets of the town for the purpose of laying water-pipes. The summer being very dry, the air became insupportably dusty, the wind driving to the houses, and everything of a deleterious nature with it. The fever, however, was of a mild kind, and but few deaths occurred.

Forest Glen was visited by a persistent and widespread malarial fever in the summer of 1896, caused by two stagnant lakes. In March last the lakes were drained, and since that time there have been no cases of fever.

The town of Rockville contains a population of 1,568 inhabitants, and during the year 1895 had but ten deaths, which is a smaller percentage than any town in the State. It is now well supplied with pure water from artesian wells, and there are no nuisances to generate disease. The present sanitary condition of the county is good.

Dr. Wm. L. Lewis, Health Officer, Kensington, report on vital statistics.

Prince George's County.

Dr. W. H. Gibbons, Health Officer, December 9, 1897.

The sanitary condition of our county is very good as far as I have been able to see and hear. There have been very few cases of typhoid fever, I think, compared with former years; there are a few cases of diphtheria in a part of the county bordering on Washington city, D. C., but will endeavor to stamp it out as soon as possible. Have no returns of vital statistics, because none have been received from others, nor have any myself. Did not know there was such a law.

Dr. J. R. Huntt, Health Officer.

Laurel, December 8th, 1897.

I take pleasure in reporting the sanitary condition of our city and surrounding country to be in better condition for the past year than formerly.

The visitation of the Secretary of the State Board of Health and his Inspector about a year ago had a very good effect. We find the people are becoming reconciled to the seeming hardship imposed upon them. Stagnant pools have been removed. Outhouses have been made to conform to local requirements.

Drinking waters from individual wells have been looked after more carefully, and the public seem to realize that recommendations made by the local health officials are of vital importance, whereby health and life have been preserved.

We have had less typhoid fever than for several years. The different types of malarial fever have seemed less also.

We have had no measles or diphtheria in this section for past twelve months. An eruptive disease resembling scarlatina made its appearance in the public schools recently, and was pronounced "rubella scarlatina-forme." Duration of no one case was more than four days, it being of very mild type. Out of some fifty or sixty cases not a single death, yet there was considerable diversity of opinion among the physicians who saw the cases.

Queen Anne's County.

No report.

Somerset County.

No report.

St. Mary's County.

Dr. L. B. Johnson, Health Officer, December 6, 1897.

In making a report upon the sanitary condition of our county, we are forcibly reminded of the importance of having some report from the physicians practicing within its limits. My location in the county being central, enables me to get a very good general idea of our sanitary condition, notwithstanding the absence of information from other physicians.

During the year, in the months of January and February, we had an epidemic of La Grippe, which, though very general and affecting many of the physicians at one time, leaving the residents without medical aid, caused very few deaths.

The summer and fall have been characterized by unusual healthfulness. We have had less typhoid fever this year than at any time since I began to practice here, and this has been the experience of the physicians generally.

During the month of September, a mild epidemic of scarlet fever occurred in the county, mostly among the colored population. As the disease was of a mild form, it was allowed to get into one school before discovered. When discovered an investigation was made, and disclosed the fact that all, or nearly all the chileren in that school had caught the disease and recovered from it.

There has been more sickness from malaria than from any other malady, though perhaps we have had less malaria this year than for the last year or two. I attribute this decrease in malaria

in part to the great number of artesian wells in use. The remittent and also the intermittent type when neglected have a tendency to run into a typhoid condition, lasting from three to five weeks, and often diagnosed as typhoid fever. I feel confident in making the statement that a large per cent. of our so-called typhoid fever, if a microscopic examination was made, would find the bacillus of Eberth absent, and clear case of malarial remittent diagnosed.

I know of but three cases of diphtheria in the county this year, all in one family. Behring's antitoxin was used and all recovered. One child, the sickest of the three, had no other treatment but the antitoxin.

Since the scare from the outbreak of small-pox in our sister county, Charles, has subsided, vaccinations have been neglected and children admitted into the schools without being vaccinated.

Talbot County.

Dr. Thomas A. Councell, Health Officer. No report.

Washington County.

Dr. J. McPherson Scott, Health Officer:

The first year of my service as health officer of Washington county, although not a realization of all that is desired, presents many encouragements. There has been, with few exceptions, prompt and cheerful response by individuals to my suggestions directing their attention to domiciliary conditions likely to endanger their own health or that of their neighbors. I wish to make this public acknowledgment of my appreciation of their ready co-operation.

For several years scarlatina has been present in Hagerstown. The type has fortunately been mild. Its continued existence is probably due to inefficient quarantine. Complete isolation, thorough disinfection of apartment,clothing, &c., is well nigh impossible in the average household, hence the probability that imperfect isolation and quarantine are largely contributory to this continuance of scarlet fever. What part unsanitary surroundings play as a factor in causing and continuing this disease I am unable to say, as Hagerstown has neither health officer, board of heath or special sanitary laws.

I regret to say that the recommendations earnestly and intelligently made to the mayor and council by the gentleman who preceded me, as health officer of Washington county, met with no response whatever, and that similar treatment has been accorded the suggestions I have made to the municipal government for the improvement of the sanitary condition of the city, and the consequent protection of the health and lives of our people.

On May 6th, 1897, I addressed a letter to the mayor and council of Hagerstown, as, in the absence of a municipal board of health, I regarded it as a part of my official duty, as health officer of Washington county, to address them upon local sanitation and call their attention to certain prevailing conditions within the municipality which menaced or actually endangered the public health. Among these suggestions were the establishment of a city board of health, regarding it as a great dereliction and a discredit to any town of our population and importance that it did not possess such a board, clothed with ample authority to protect our citizens from almost intolerable nuisances, and to ward off preventable diseases or limit their invasion.

Furthermore, it was suggested that hog-pens should be removed from within the city limits, and that a system should be adopted whereby swill and garbage would be removed under municipal direction and control. Attention was directed to the filthy condition of many of the central, low-lying and much traveled alleys, and suggestion was made that they be cobbled or paved. None of these suggestions has been ever considered.

The hog-pens remain apparently an immovable institution, and the alleys continue filthy, presenting themselves as ideal seed beds or culture media for the propagation of disease germs. If scarlatina and diphtheria are diseases depending upon filthy conditions for their development, it is not just to ascribe the existence of sixty-five cases of the former disease, and thirty-three of the latter, during the past twelve months, solely to communicability arising from defective isolation and quarantine. As has been said by one of our most brilliant medical teachers, that "we could stamp out typhoid fever in Maryland in five years if it was not for the politicians"—so could there be in Hagerstown all the protection which sanitation affords, if it was not for the politics and political "futures." In this connection I wish to bear public testimony to the readiness with which the physicians of Hagerstown have reported to me cases of scarlatina and diphtheria occurring in their practice. They have reported these cases promptly with unreserved cordiality, and I am sure that they have urged upon the various households in which these cases occurred the great necessity of isolation of the patient and subsequent disinfection of apartment and clothing. The house has been placarded in every instance, so that the public has thereby had the display of the cautionary signal.

Public vaccination, or vaccination of the indigent, has been well systematized in Washington county, and ample provision has now been made for the vaccination of all who are unable to pay for the service. Not only will the work be probably more thoroughly done, but the expense to the county will be less than

under the old plan, when physicians generally vaccinated all indigent applicants, and charged the county with the individual service.

Upon my suggestion, the County Commissioners increased the division of the county into fifteen vaccine districts, with a physician to each, to whom is assigned the duty of vaccinating all indigent children within the limits of his district. These gentlemen are apparently much interested in successful prosecution of their work, and I believe that a few years will find the children of this county well protected.

The performance of good public sanitary work is dependent upon the subdivision and allotment to intelligent and conscientious persons, who realize its immense benefit to the community in preventing disease, and saving to the people the distressing train of consequences following upon ignorance or disregard of the ordinary laws of sanitation and health.

It is my purpose with the advent of the year to propose to our County Commissioners, that each vaccine physician be appointed an advisory member of the County Board of Health, so that he will be authorized to report to the central office, any unsanitary conditions in his district, and suggest methods for abatement. In this manner, a general sanitary supervision will be maintained over the entire county, and the Board will be able to give prompt attention and correction to the conditions so reported.

There is a manifest readiness on the part of our people to co-operate, and I doubt not that the above arrangement, if it can be successfully effected, will not only be productive of great good as corrective of unsanitary conditions, but will awaken popular interest in the subject.

With the exception of scarlatina and diphtheria, the general health of Washington county has suffered no special invasion during the past year.

Wicomico County.

Dr. C. R. Truitt, Health Officer.

April 26th, 1897, I visited White Haven, and found the place poorly drained, the ditches in bad condition. The ditch along the county road is in bad condition and filled with mud, trash and stagnant water. This ditch empties into another large ditch that crosses the marsh from southwest to northeast, and is also in bad condition. If this large ditch was cleaned out it would be flushed by the river.

There was formerly a ditch that passed through the lands of Mr. J. F. Bloodsworth, and drained the lands of three families. After this ditch was closed by Mr. Bloodsworth, the storm water ran over the lands of the other families and under their privies,

and washed out fecal discharges, over the lots and front yards, out to the road. After the rain was over, and the sun shone out, the odors were very bad. They have now put in an underground drain to the river, and so far, I have heard no more complaint.

May 7th, 1897, I was asked by the City Council to inspect a ditch at the head of Main street. The place is in bad condition and unhealthy, as the water-closet from the Humphrey's building empties into the ditch.

May 21st, 1897, received complaint from Quantico, that Mr. ———had killed an old horse, and had put it in his lot near the Main street, and turned in hogs to devour it. The odor was very bad. Ordered it buried and covered with charcoal; also ordered hog pens cleaned.

June 5th, 1897, I visited Powellsville, and examined the ditch that runs through the place. Found it in bad condition, and dangerous to health. An epidemic of diphtheria occurred there last fall. The contract for cleaning the ditch has since been sold.

June 8th, learned of diphtheria at Pittsvile in the practice of Dr. Freeny. The cause seemed to be an old well. Had the well cleaned, and had no more cases. The child recovered.

June 23d, complaint made that Johnson's mill pond was in a state of nuisance and dangerous to health. I notified Messrs. Johnson and Bell to abate the nuisance. There is a great deal of sickness in the neighborhood, and most of it is laid to the old mill pond with its stagnant pools of water. The dam is broken, and there was not enough water to cover the bottom. I hear that this dam has been put on the county, if so, it should be repaired at once, as it is a road frequently used.

June 24th, complaints were made that Humphrey's mill pond is in a state of nuisance. Nearly all the water has been run out through the mill. I notified Mr. Phillips to cease using water and to use stream, which they have since done.

August 19th, I received complaint from Delmar. Complaint had also been made to the State Board of Health. At Mr. W. B. Elliott's, I found the water running into the streets, where it stagnated. At Mrs. Jane Elliott's, the water was running in the street, where it became offensive. The Town Commissioners were notified to clean out the ditch that runs east and west through the town. People, whose property is next to the ditch, throw into it dead animals and fowl, spoiled eggs, and all sorts of refuse.

Thomas E. Hearn empties refuse into the ditch.

W. C. Lecates, W. O. West, W. A. Culver, Geo. A. Waller, W. C. Truitt, B. B. Gordy, Ulyses Baker, T. A. Veasey, T. A. Landing, tenant, M. H. German (a block of houses), all run waste

water into the street. Veasey Hotel empties sewer into railroad ditch, also a sewer from water-closet.

The above places are in Delmar, and owners were notified to abate nuisances in fifteen days. From later reports I learn that they have all obeyed the notice.

August 20, 1897, I was asked to visit the Jackson farm, where Mrs. Mills lives. There had been several cases of typhoid there in previous years. On investigating, found surroundings filthy and in very bad condition. Notified to clean the premises at once, and put a new bench cover over the pump.

September 10th, 1897, complaint that the dumping grounds on river front near old basket factory was in bad condition and unhealthy. On investigating, found nothing unhealthy, but much that is unsightly.

September 11th, many complaints received from Quantico, that a bad odor filled the town. I went again to this place, and on investigating, found that an old mule had jumped over a fence into the marsh, and had gotten fast in the mire and died, having been there for several days. Ordered it buried, covered with boards, and dirt put on top of the boards to keep the hogs from rooting it out. Notified Mr. ——— that if I had to see him any more for maintaining a nuisance, he would certainly be prosecuted.

September 27th, 1897, William Morris made complaint that the water in the Cranberry Bog was stagnant and unhealthy. On visiting the place I found no need of action.

September 28th, 1897, I visited Nanticoke. Had heard from several persons that there was typhoid fever, and, as I had not been notified, I went to see Dr. Ben Lankford. The cases have recovered. I had written several times, enclosing stamped return envelope, but received no reply.

October 11th, 1897, complaint made that the water from the fountain, corner of Main and Dock streets, was standing in the gutter and becoming offensive. Ordered the gutter cleaned and the water run off, which was done.

Besides the above, outbreaks of scarlet fever have been reported by four physicians. Outbreaks of typhoid fever by three physicians. Outbreaks of diphtheria by four physicians. Private nuisances inspected, 24. Dead animals removed, 3.

Worcester County.

J. B. R. Purnell, M. D., Health Officer, June 1, 1897.

I visited Ocean City on the 5th and 6th of May, 1897. Having knowledge of rumor concerning Ocean City, and recent indubitable evidence of the effect of suspicion and apprehension on the

part of the many people of Baltimore and other parts of the State relative to the healthfulness of that place as a summer and winter resort, I determined to make investigation with the object of ascertainment of facts pertaining thereto.

The fact of but little sickness among permanent residents and even visitors who go there in health, except usually as may occur from some imprudence, is well attested.

The low mortality for a year, March 16, 1896, to March 15, 1897, two deaths in a permanent population of about three hundred and twenty, or five-eighths of 1 per cent. (equivalent to 6.25 per thousand, if it had the population), I think I gave in a letter some time ago.

In same period only one death occurred among the visiting residents. It was a case of general tuberculosis—a patient who went there in ill health.

Some of the low marshy ground has been filled or raised above the ordinary level; two or three other small places near the bay could be improved by the same treatment; if doing no other injury they are apt to give rise to unfavorable rumor as to sanitary conditions.

The water of private driven wells and the artesian well, so far as I notice, was very clear and colorless, and right in reference to odor and taste, and I applied but little chemical test just then. I however obtained some water from the artesian well of that place for chemical examination at my own home. Regretting the circumstance of loss by fire some years ago of nearly all my chemical apparatus, I nevertheless believe I made an entirely satisfactory examination.

Injuriously impure artesian well water, as we are creditably informed, has been included in vague reports. That idea is certainly not in accord with the results of my investigations. On examination of the water for various poisons and other objectionable mineral substances, none was found. Animal or vegetable organic matter, after circumspect attention, could not be detected. The presence of basic salts, or such as commonly found in well water, was evident, which however are ordinarily innocuous. In my judgment there is no management of garbage equal to burning; i. e. previous to decomposition or tendency thereto. By that means all evil results are avoided while the fire reduces it to ashes, which can be utilized. Any bone present with refuse material may be transformed into active fertilizer by a simple though not rapid method of combination with ashes. The object of burning can be made two-fold, i. e. not only to preclude direct effects of decay, but to prevent contamination of drinking water from exposure of the waste matter to the rains and perculation through the earth.

ABSTRACT OF REPORTS BY THE ANALYST, PROF. W. B. D. PENNIMAN.

SUMMARY OF WATER EXAMINATIONS SINCE OCTOBER 8, 1896.

469 Examinations—290 private supplies. 41 good; 236 bad; 7 fair; 5 doubtful; 1 suspicious.

179 Public Supplies. Abstracts of Chemical Reports are Appended.

INFORMATION CONCERNING WATER SENT FOR ANALYSIS.

HOW SAMPLES ARE TAKEN.

a. Only new glass demijohns, of two quarts capacity, or over, shall be used. The contents of stone jugs, old bottles, or demijohns will not be analyzed.

b. The demijohn is to be cleaned by rinsing it at least five (5) times with the water which you mean to send. No soap, soda, or other chemical is to be used.

c. If from pump or spigot, allow the water to run several minutes before filling the demijohn. If from creek, river, pond, or lake, dip the demijohn below the surface of the water, being careful not to stir up the water at the bottom, or to obtain the floating particles on top. If the spring is small, use a cup that has been rinsed several times.

d. Fill the demijohn, not full by two (2) inches. Stop with a new cork. Cut off the top of the cork even with the top of the demijohn, and seal with sealing wax.

e. See that the record on the tag corresponds with the survey sheet, attach securely to the demijohn, and forward by express to the chemist.

f. Mail the sanitary survey to the State Board of Health, at No. 10 South street.

SANITARY SURVEY.

A sanitary survey includes both source and surroundings. Careful examination will often lead one to considerable distance from the point at which the sample is taken, and the results of the survey alone may condemn the water. Be sure to indicate clearly the relation of the supply to all possible sources of contamination.

Health officers or other persons sending samples of water for analysis are required to return as full answers as possible to the following questions:

1. Sample from (give owner of property, tenant, town, county, and post-office.)
2. Sample taken; (date;) by whom.
3. Source of supply; (well, river, creek, canal, pond, lake, spring,) giving proper name, if it has any.
4. Does the appearance or taste of the water change at different seasons of the year, after storms or any other disturbing causes?
5. Does the sample present the usual appearance of the water?
6. If from well, give diameter, (ft.;) depth, (ft.;) covered or open; surroundings cleanly or not. Can surface water get into it? State character of soil, subsoil, and water-bearing stratum.
7. Give nature of, and distance from, any possible source of contamination, such as well or spring, from hog-pen, cesspool, sewer, privy, stable

stock yard, slaughtering-house, rendering establishment, tannery, distillery, fertilizer, gas, glue, soap, or bleaching works, or any other source of pollution.

8. If from running stream, pond, or lake, is it subject to pollution at any point up-stream (see No. 7,) and if so, how?

9. Is there, or has there been, any sickness among those using the water; if so, what is the nature of the disease, and number of cases?

10. Tell us whatever else, in your judgment, is of interest and importance.

The Data of Chemical Judgment.

Good drinking water should be clear and colorless, without odor, and neutral in action.

1. The "Total Residue" should not exceed 5.00 parts per million.
2. The "Ignited Residue" may constitute the total residue.
3. The smaller the amount of "Volatile Residue" the better.
4. The amount of "Chlorine" should not exceed 6.00 parts per million.
5. The amount of "Nitrogen as Free Ammonia" should not exceed .05 parts per million.
6. The amount of "Nitrogen as Albumenoid Ammonia" should not exceed .15 parts per million.
7. The amount of "Nitrogen as Nitrates" should not exceed 5.00 parts per million.
8. There should be no "Nitrites" present, as they indicate active decomposition of organic matter.
9. The amount of "Earthy Bases" should not exceed 200.00 parts per million.
10. The amount of "Sulphates" should not exceed 100.00 parts per million.

Allegany County.

15 Examinations—3 private supplies. 2 good; 1 bad.
12 public supplies, as follows:

Well inside Water Works, Cumberland.

Color	Yellow
Odor	None
Reaction	Neutral
Total residue	320.
Chlorine	14.
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.215
Nitrates	None
Nitrites	None
Character of water	Bad

October 6, 1897.

Spigot about one mile distant from water works, Cumberland.

Color	Yellow
Odor	None
Reaction	Neutral
Total residue	298.

Chlorine	14.
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.19
Nitrates	None
Nitrites	None
Character of water	Bad

October 6, 1897.

Wills Creek, Cumberland, at W. Va. Central Railroad Bridge.

Color	Yellow
Odor	None
Reaction	Neutral
Total residue	398.
Ignited residue	200.
Volatile residue	198.
Chlorine	26.
Nitrogen as Free Ammonia	.29
Nitrogen as Albumenoid Ammonia	.24
Nitrates	Trace

September 1, 1897.

Potomac River, Cumberland—Effluent of Experimental Sand Filter.

Color	Yellow
Odor	None
Reaction	Neutral
Total residue	254.
Ignited residue	32.
Volatile residue	222.
Chlorine	13.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	Trace

September 1, 1897.

George's Creek at Westernport, near W. Va. Bridge, over George's Creek.

Color	Yellow
Odor	None
Reaction	Acid
Total residue	1782.
Ignited residue	1072.
Volatile residue	710.
Chlorine	14.
Nitrogen as Free Ammonia	Trace

Nitrogen as Albumenoid Ammonia	.15
Nitrates	Trace

September 1, 1897.

Potomac River, one-half mile below Westernport—The outflow of George's Creek into Potomac River.

Color	None
Odor	None
Reaction	Acid
Total residue	2018.
Ignited residue	1240.
Volatile residue	778.
Chlorine	13.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.75
Nitrates	Trace

September 1, 1897.

Lonaconing Reservoir near the Intake.

Total residue	92.
Chlorine	25.4
Nitrogen as Free Ammonia	.095
Nitrogen as Albumenoid Ammonia	.120
Nitrates	Trace
Nitrites	Trace
Character of water	Bad

July 7th, 1897.

Potomac River at Luke, above Pulp and Paper Mills.

Color	Yellow
Odor	None
Reaction	Neutral
Total residue	66.
Ignited residue	18.
Volatile residue	48.
Chlorine	10.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.105
Nitrates	Trace

September 3d, 1897.

Sewer at Pulp and Paper Works, Potomac River, Luke.

Color	Yellow
Odor	None
Reaction	Neutral

Total residue	2164.
Ignited residue	1318.
Volatile residue	846.
Chlorine	270.
Nitrogen as Free Ammonia	.069
Nitrogen as Albumenoid Ammonia	.078
Nitrates	Trace

September 1st, 1897.

Potomac Pulp and Paper Works, Luke—Out-flow from Bleacheries and Pulp Wash.

Total residue	672.
Ignited residue	80.
Volatile residue	542.
Chlorine	61.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.126
Nitrates	Trace

September 1st, 1897.

Potomac River at Luke—West Side below Pulp and Paper Works.

Color	Red
Odor	None
Reaction	Neutral
Total residue	278.
Ignited residue	130.
Volatile residue	148.
Chlorine	10.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.042
Nitrates	Trace

September 1st, 1897.

Potomac River at Cumberland—Intake of City Supply.

Color	Yellow
Odor	None
Reaction	Neutral
Total residue	244.
Ignited residue	36.
Volatile residue	208.
Chlorine	10.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.19
Nitrates	Trace

September 1st, 1897.

Anne Arundel County.

12 Examinations—10 private supplies; all bad.
2 public supplies, as follows:

Brooklyn "Bank," Brooklyn.

Total residue	216.
Amt. of Chlorine	30.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.051
Nitrates	8.30
Nitrites	None
Character of water	Bad

September 27th, 1897.

Brooklyn "Lock-Up," Brooklyn.

Total residue	146.
Chlorine	16.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Am.	Trace
Nitrates	5.
Nitrites	None
Character of water	Bad

September 27th, 1897.

Private wells in Brooklyn examined in connection with an outbreak of typhoid fever.

Mr. James Hawkins, Brooklyn.

Total residue	322.
Chlorine	47.3
Nitrates	16.6
Nitrites	Trace
Character of water	Bad

September 14, 1897.

L. Greineisen, Brooklyn.

Total residue	144.
Chlorine	26.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.657
Nitrates	5.8
Nitrites	None
Character of water	Bad

September 27, 1897.

Charles Watler, Brooklyn.

Total residue	200.
Chlorine	36.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.06
Nitrates	6.66
Nitrites	Trace
Character of water	Bad

September 27, 1897.

Mrs. George Lehman, Brooklyn.

Total residue	102.
Chlorine	14.4
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.111
Nitrates	6.66
Nitrites	Trace
Character of water	Bad

September 27, 1897.

Joseph W. Marshall, Brooklyn.

Total residue	160.
Chlorine	25.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.069
Nitrates	6.66
Nitrites	None
Character of water	Bad

September 27, 1897.

F. P. Anderson, Brooklyn.

Total residue	144.
Chlorine	7.6
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.052
Nitrates	3.65
Nitrites	None
Character of water	Bad

September 27th, 1897.

Mrs. J. Stuart, Brooklyn.

Total residue	326.
Chlorine	58.4
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace

Nitrates	9.86
Nitrites	Large amt
Character of water	Very bad

September 27th, 1897.

John Lang, Brooklyn.

Total residue	225.
Chlorine	33.5
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.053
Nitrates	10.
Nitrites	None
Character of water	Bad

September 27th, 1897.

BALTIMORE, October 9th, 1897.

DR. JOHN S. FULTON,

Secretary State Board of Health of Maryland.

DEAR SIR: I beg leave to submit the bacteriological report upon the nine samples of drinking water taken from the wells in Brooklyn, Maryland, on October 4th, 1897.

Sample 1. Labelled L. Griemisen—well.

Colonies, per cubic centimeter, 330. Fermentation test for presence of bacillus coli communis (intestinal bacillus,) in 0.5 and 50 cubic centimeters of water, negative. No evidence of contamination from intestinal secretions. Bacteria high for deep well water. Unfit for drinking.

Sample 2. Labelled Charles Walter—well.

Colonies per cubic centimeter, 170. No colon bacilli in 0.5 and 50 cubic centimeters of water. Good water.

Sample 3. Labelled George Lehmann—well.

Colonies per cubic centimeter, 894. Colon bacillus (intestinal bacillus,) present in 50 cubic centimeters of water. Unfit for use.

Sample 4. Labelled Jos. W. Marshall—well.

Colonies per cubic centimeter, 224. No colon bacilli (intestinal bacillus) present in 0.5 and 50 cubic centimeters of water. Water good.

Sample 5. Labelled Jos. Hawkins.

Colonies per cubic centimeters, 884. No colon bacilli present in 0.5 or 50 cubic centimeters of water. Unfit for drinking purposes.

Sample 6. Labelled "Bank," Brooklyn—well.

Colonies per cubic centimeter, 46. No colon bacilli present in 0.5 or 50 cubic centimeters of water. Water good.

Sample 7. Labelled Frank P. Anderson—well.

Colonies per cubic centimeter, 770. No colon bacilli present in 0.5 or 50 cubic centimeters of water. Unfit for drinking water.

Sample 8. Labelled Mrs. J. Stuart—well.

Colonies per cubic centimeter, 75. No colon bacilli in 0.5 or 50 cubic centimeters of water. Good Water.

Sample 9. Labelled " Lock up "—well.

Colonies per cubic centimeter, 330. Colon bacilli present in 50 cubic centimeters of water. Unfit for drinking purposes.

Numbers three and nine were found to be polluted with intestinal bacilli (bacillus coli communis or colon bacillus,) and this might account for much of the typhoid fever present. The other waters condemned were so classed upon the assumption, that deep well water containing over 250 bacteria per cubic centimeter, is to some extent polluted. Percy Frankland and others have found that pure deep wells only contain from 5-30 bacteria per cubic centimeter.

Respectfully submitted,

Wm. Royal Stokes, M. D.

Baltimore County.

208 Examinations—192 private supplies; 13 good; 169 bad; 2 suspicious; 2 doubtful; 6 fair.

16 public supplies, as follows:

Emory Grove.

Pump on Roberts avenue—character of water.......	Good
Pump near preacher's tent—character of water......	Good
Pump at Thompson and Fifth avenues—character of water	Good

August 21, 1896.

Glyndon Grove Pavilion Pump.

Character of water..	Good

August 27, 1896.

Public School Well at Govanstown.

Total residue	198.
Ignited residue	66.
Volatile residue	132.
Chlorine	26.
Nitrogen as Free Ammonia	.09
Nitrogen as Albumenoid Ammonia	.18
Nitrates	2.
Nitrites	None
Character of water	Bad

September 19, 1896.

Public School No. 1, District 13.

Total residue	88.
Ignited residue	50.
Volatile residue	38.
Chlorine	8.2
Nitrogen as Free Ammonia	Trace
Nitrogen, Albumenoid Ammonia	.066
Nitrates	.3
Nitrites	None
Character of water	

The amount of chlorine is so high that I advise a thorough inspection of the stream.

December 3, 1896.

Public Well on Sixteenth Street.

Total residue	509.
Ignited residue	428.
Volatile residue	81.
Chlorine	52.7
Nitrogen as Free Ammonia	.017
Nitrogen, Albumenoid Ammonia	.057
Nitrates	10.9
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Chesterwood, Bear Creek.

Free summer excursion grounds—character of water. Good

July 15, 1897.

Penwood Park. Pennsylvania Steel Company, Owner.

Color	Cloudy
Total residue	584.
Chlorine	100.
Nitrogen as Free Ammonia	Trace
Nitrogen, Albumenoid Ammonia	.27
Nitrates	Trace
Nitrites	None
Charcter of water	Bad

August 28, 1897.

T. B. Bosley's Hotel.

Total residue	730.
Chlorine	154.4
Nitrogen as Free Ammonia	Trace
Nitrogen, Albumenoid Ammonia	.075
Nitrates	25.
Nitrites	Trace
Character of water	Very bad

October 6, 1897.

Well Used by Public School. Mrs. Mary Butler, Owner.

Total residue	380.
Chlorine	76.
Nitrogen as Free Ammonia	.034
Nitrogen as Albumenoid Ammonia	.041
Nitrates	16.6
Nitrites	Trace
Character of water	Very bad

October 6, 1897.

Har Sinai Cemetery.

Total residue	103.
Chlorine	14.15
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	4.2
Nitrites	Trace
Character of water	Bad

October 27, 1897.

Public School No. 3, District No. 8.

Total residue	278.
Chlorine	33.8

7

Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	10.2
Nitrites	None
Character of water	Bad

August 9, 1897.

Mt. St. Clement's College, Ilchester.

Total residue	98.
Chlorine	6.8
Nitrogen as Free Ammonia	.05
Nitrogen as Albumenoid Ammonia	.03
Nitrates	Trace
Nitrites	None
Character of Water	Bad

November 12, 1897.

Maryland College, Lutherville.

Total residue	216.
Chlorine	6.
Nitrogen as Free Ammonia	.041
Nitrogen as Albumenoid Ammonia	.098
Nitrates	1.60
Nitrites	None
Character of water	Bad

November 22, 1897.

Hitshire Hotel, Reisterstown.

Total residue	174.
Chlorine	31.2
Nitrogen as Free Ammonia	.060
Nitrogen as Albumenoid Ammonia	.087
Nitrates	4.75
Nitrites	Trace
Character of water	Bad

November 28, 1897.

Private wells examined in connection with outbreak of typhoid fever near Chase:

Mrs. Kate Harris, Chase.

Total residue	196.
Chlorine	20.4

Nitrogen as Free Ammonia	.06
Nitrogen as Albumenoid Ammonia	.15
Nitrates	7.4
Nitrites	Trace
Character of water	Bad

October 23, 1897.

Harmon Draayer, Chase. (*Spring No.* 1.)

Total residue	98.
Chlorine	7.8
Nitrogen as Free Ammonia	.12
Nitrogen as Albumenoid Ammonia	.12
Nitrates	2.5
Nitrites	None
Character of water	Bad

October 23, 1897.

Harmon Draayer, Chase. (*Spring No. 2.*)

Total residue	84.
Chlorine	8.8
Nitrogen as Free Ammonia	.072
Nitrogen as Albumenoid Ammonia	.120
Nitrates	Trace
Nitrites	Trace
Character of water	Bad

October 23, 1897.

October 21, 1897.

Dr. John S. Fulton,

Secretary of State Board of Health, Maryland.

Dear Sir: I respectfully submit my report upon the bacteriological examination of the well and spring waters from Chase, Md., collected on Friday, October 15, 1897.

Sample No. 1—Spring nearer house of Draayer family. Water clear, no odor. Microscopic sediment negative.

Five cubic centimeters were introduced into the fermentation tubes, and the subsequent reactions were typical of the bacillus coli communis. The reactions in all of the various other media and the staining tests also corresponded to those of the bacillus coli communis.

Conclusions.

Bacillus coli communis in five cubic centimeters of water.

Sample No. 2—Spring further from house of Draayer family. The sides of the barrel of this spring were covered with a greenish, shreddy deposit. This, under the microscope, was seen to consist of microscopic animalculæ of the class of infusoria, called paramecium and monas. These organisms are usually found in polluted water. The bacillus coli communis present in five cubic centimeters of water.

Sample No. 3—Harris' well. No bacillus coli communis present in five cubic centimeters of water. Microscopic sediment negative.

The presence of the bacillus coli communis in the first two samples—furnishing the water supply to a family in which three persons were suffering from typhoid fever—is interesting, since it shows the presence of intestinal deposits in the water. This, in connection with the fact that surface drainage could enter either of the springs, certainly furnishes the most reasonable explanation of the cause of the typhoid fever.

Very respectfully,

WM. ROYAL STOKES, M. D.

The following are published as illustrating a very high degree of pollution found in many wells in closely populated areas:

Highlandtown, 1001 Fifth Avenue. Owner of well, Christ Ebert.

Total residue	469.
Ignited residue	206.
Volatile residue	263.
Chlorine	73.2
Nitrogen as Free Ammonia	.05
Nitrogen as Albumenoid Ammonia	.15
Nitrates	20.
Character of water	Unfit for use

December 9, 1896.

Well corner Fifth Avenue and Gough Street.

Total residue	354.
Ignited residue	222.
Volatile residue	132.
Nitrogen as Free Ammonia	.02
Nitrogen as Albumenoid Ammonia	.08

Chlorine	85.4
Nitrates	6.5
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well corner Bank Street and Fifth Avenue.

Total residue	50.
Ignited residue	34.
Volatile residue	16.
Chlorine	6.1
Nitrogen as Free Ammonia	.68
Nitrogen as Albumenoid Ammonia	.07
Nitrates	.9
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Artesian Well, 501 Eastern Avenue.

Total residue	162.
Ignited residue	91.
Volatile residue	71.
Chlorine	42.7
Nitrogen as Free Ammonia	.02
Nitrogen as Albumenoid Ammonia	.02
Nitrates	1.
Nitrites	None
Character of water	Doubtful

December 9, 1896.

Well corner Claremont and Fifth Avenues.

Total residue	539.
Ignited residue	243.
Volatile residue	197.
Chlorine	115.4
Nitrogen as Free Ammonia	.15
Nitrogen as Albumenoid Ammonia	.15
Nitrates	6.3
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well corner Pratt Street and Fifth Avenue.

Total residue	101.
Ignited residue	54.
Volatile residue	47.
Chlorine	18.3
Nitrogen as Free Ammonia	.02
Nitrogen as Albumenoid Ammonia	.08
Nitrates	3.9
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well corner Fifth Avenue and Pratt Street.

Total residue	587.
Ignited residue	462.
Volatile residue	125.
Chlorine	103.7
Nitrogen as Free Ammonia	.68
Nitrogen Albumenoid Ammonia	.23
Nitrates	15.
Character of water	Unfit for use

December 9, 1896.

Well corner Lombard Street and Fifth Avenue.

Total residue	100.
Ignited residue	67.
Volative residue	33.
Chlorine	18.3
Nitrogen as Free Ammonia	.06
Nitrogen as Albumenoid Ammonia	.04
Nitrates	3.9
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at 1225 Fifth Street.

Total residue	328.
Ignited residue	273.
Volatile residue	55.
Chlorine	54.1
Nitrogen as Free Ammonia	.17
Nitrogen as Albumenoid Ammonia	.16
Nitrates	1.10
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at Fifth Avenue and Lombard Street.

Total residue	73.
Ignited residue	51.
Volatile residue	22.
Chlorine	18.3
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	0.08
Nitrates	None
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at Lombard and Seventh Streets.

Total residue	66.
Ignited residue	52.
Volatile residue	14.
Chlorine	18.3
Nitrogen as Free Ammonia	.04
Nitrogen as Albumenoid Ammonia	.07
Nitrates	.4
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at Seventh and Lombard Streets—701.

Total residue	101.
Ignited residue	54.
Volatile residue	47.
Chlorine	18.3
Nitrogen as Free Ammonia	.38
Nitrogen as Albumenoid Ammonia	.07
Nitrates	1.7
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at Eighth and Lombard Streets.

Total residue	714.
Ignited residue	428.
Volatile residue	286.
Chlorine	103.7
Nitrogen as Free Ammonia	1.07
Nitrogen as Albumenoid Ammonia	.23

Nitrates	12.5
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at Eighth and Lombard Streets—John Ruhl, Tenant.

Total residue	385.
Ignited residue	219.
Volatile residue	166.
Chlorine	79.3
Nitrogen as Free Ammonia	.68
Nitrogen as Albumenoid Ammonia	.12
Nitrates	7.5
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at 814 Lombard Street.

Total residue	1497.
Ignited residue	1034.
Volatile residue	463.
Chlorine	280.6
Nitrogen as Free Ammonia	61.5
Nitrogen as Albumenoid Ammonia	.49
Nitrates	18.00
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Lombard and Ninth Streets.

Total residue	318.
Ignited residue	215.
Volatile residue	103.
Chlorine	18.3
Nitrogen as Free Ammonia	.02
Nitrogen as Albumenoid Ammonia	.30
Nitrates	8.00
Nitrites	None
Character of water	Unfit for use.

December 9, 1896.

Eleventh and Lombard Streets.

Total residue	469.
Ignited residue	391.
Volatile residue	78.
Chlorine	48.1
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.05
Nitrates	7.5
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at No. 316 Lombard Street.

Total residue	549.
Ignited residue	438.
Volatile residue	111.
Chlorine	189.1
Nitrogen as Free Ammonia	.12
Nitrogen as Albumenoid Ammonia	.05
Nitrates	1.00
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well corner Claremont and Third Streets.

Total residue	283.
Ignited residue	131.
Volatile residue	152.
Chlorine	42.7
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.04
Nitrates	7.50
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at No. 1028, corner Bank and First Streets.

Total residue	157.
Ignited residue	93.
Volatile residue	64.
Chlorine	24.8
Nitrogen as Free Ammonia	.032
Nitrogen as Albumenoid Ammonia	.102

Nitrates	4.9
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at No. 720 Eastern Avenue and Eighth Street.

Total residue	1363.
Ignited residue	1213.
Volatile residue	150.
Chlorine	533.2
Nitrogen as Free Ammonia	.102
Nitrogen as Albumenoid Ammonia	.120
Nitrates	1.10
Character of water	Unfit for use

December 9, 1896.

Well at No. 912 Eastern Avenue.

Total residue	542.
Ignited residue	452.
Volatile residue	90.
Chlorine	74.4
Nitrogen as Free Ammonia	.536
Nitrogen as Albumenoid Ammonia	.167
Nitrates	4.9
Character of water	Unfit for use

December 9, 1896.

Well at Fairmount Avenue and Baltimore Street.

Total residue	224.
Ignited residue	170.
Volatile residue	54.
Chlorine	99.2
Nitrogen as Free Ammonia	.30
Nitrogen as Albumenoid Ammonia	.13
Nitrates	1.4
Character of water	Unfit for use

December 9, 1896.

Well on Eleventh Street. Charles Hall, Tenant.

Total residue	496.
Ignited residue	368.
Volatile residue	128.
Chlorine	179.8
Nitrogen as Free Ammonia	.053

Nitrogen as Albumenoid Ammonia	.105
Nitrates	6.25
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well on Eastern Avenue. Thomas Eckhart, Tenant.

Total residue	37.
Ignited residue	23.
Volatile residue	14.
Chlorine	4.6
Nitrogen as Free Ammonia	.224
Nitrogen as Albumenoid Ammonia	.042
Nitrates	Trace
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at Sixteenth Street and Foster Avenue.

Total residue	238.
Ignited residue	143.
Volatile residue	95.
Chlorine	49.6
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.06
Nitrates	11.65
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well on O'Donnell Street, Canton. Mr. Geo. W. Bertlett, Tenant.

Total residue	136.
Ignited residue	76.
Volatile residue	60.
Chlorine	31.
Nitrogen as Free Ammonia	.007
Nitrogen as Albumenoid Ammonia	.102
Nitrates	3.20
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at Sixteenth and O'Donnell Streets, Canton.

Total residue	197.
Ignited residue	146.
Volatile residue	51.
Chlorine	43.4
Nitrogen as Free Ammonia	.259
Nitrogen as Albumenoid Ammonia	.143
Nitrates	7.00
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well of William Martin, Sixteenth Street, Canton.

Total residue	156.
Ignited residue	131.
Volatile residue	25.
Chlorine	24.8
Nitrogen as Free Ammonia	.015
Nitrogen as Albumenoid Ammonia	.150
Nitrates	5.44
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well corner Fourteenth and O'Donnell Streets, Canton.

Total residue	479.
Ignited residue	387.
Volatile residue	92.
Chlorine	86.8
Nitrogen as Free Ammonia	.833
Nitrogen as Albumenoid Ammonia	.147
Nitrates	1.50
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well corner Fourteenth and O'Donnell Streets, Canton.

Total residue	201.
Ignited residue	137.
Volatile residue	64.
Chlorine	43.4
Nitrogen as Free Ammonia	.012
Nitrogen as Albumenoid Ammonia	.150

Nitrates	1.50
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well corner O'Donnell and Thirteenth Streets, Canton. Henry LeBrun, Tenant.

Total residue	120.
Ignited residue	84.
Volatile residue	36.
Chlorine	24.8
Nitrogen as Free Ammonia	.009
Nitrogen as Albumenoid Ammonia	.300
Nitrates	4.00
Nitrites	None
Character of water	Unfit for use

December 9, 1896.

Well at O'Donnell and Eleventh Streets, Canton. J. H. LeBrun, Tenant.

Total residue	95.
Ignited residue	26.
Volatile residue	69.
Chlorine	12.2
Nitrogen as Free Ammonia	.015
Nitrogen as Albumenoid Ammonia	.018
Nitrates	2.8
Nitrites	None
Character of water	Suspicious

Remarks: This water should be analyzed again and the analyses compared, before a final conclusion is drawn.

December 9, 1896.

Carroll County.

44 Examinations—5 private supplies. 2 good; 3 bad.
39 public supplies, as follows:

Public Schools of Carroll County—From Union Bridge. Samuel Yingling, Owner.

Total residue	411.
Ignited residue	125.
Volatile residue	286.
Chlorine	58.4

Nitrogen as Free Ammonia	.045
Nitrogen as Albumenoid Ammonia	.042
Nitrates	9.62
Nitrites	None
Character of water	Bad

April 24, 1897.

From Taneytown.

Total residue at 230 degrees Fahrenheit	549.
Ignited residue	375.
Volatile residue	174.
Chlorine	93.8
Nitrogen as Free Ammonia	.045
Nitrogen as Albumenoid Ammonia	.132
Nitrogen as Nitrates	7.58
Nitrogen as Nitrites	Trace
Character of water	Bad

April 24, 1897.

From New Windsor. David Peter, Owner.

Total residue	452.
Ignited residue	156.
Volatile residue	296.
Chlorine	55.1
Nitrogen as Free Ammonia	.042
Nitrogen as Albumenoid Ammonia	.045
Nitrates	13.51
Nitrites	None
Character of water	Bad

April 24, 1897.

Frizzellburg. Robert Baust, Owner.

Total residue at 230 degrees Fahrenheit	156.
Ignited residue	50.
Volatile residue	106.
Chlorine	16.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.153
Nitrogen as Nitrates	7.58
Nitrogen as Nitrites	Present
Character of water	Bad

April 24, 1897.

Hampsted. Charles Hoff, Owner.

Total residue at 230 degrees Fahrenheit	218.
Ignited residue	60.
Volatile residue	158.
Chlorine	62.
Nitrogen as Free Ammonia	.018
Nitrogen as Albumenoid Ammonia	.041
Nitrogen as Nitrates	Trace
Nitrogen as Nitrites	None
Character of water	Probably good

Remarks: Information not sufficient for me to express judgment.

April 24, 1897.

Manchester. Hoffnacker Brothers, Owners.

Total residue at 230 degrees Fahrenheit	345.
Ignited residue	86.
Volatile residue	259.
Chlorine	98.2
Nitrogen as Free Ammonia	.09
Nitrogen as Albumenoid Ammonia	.09
Nitrogen as Nitrates	16.67
Nitrogen as Nitrites	Trace
Character of water	Bad

April 24, 1897.

Pleasant Gap. Reno Waltz, Owner.

Character of water	Good

April 24, 1897.

Westminster.

Character of water	Good

April 24, 1897.

Smallwood. Richard Baker, Owner.

Character of water	Good

April 24, 1897.

Shade's Schoolhouse, Carroll County. Jessie Sullivan, Owner.

Total residue at 230 degrees Fahrenheit	97.
Ignited residue	30.
Volatile residue	67.
Chlorine	16.2
Nitrogen as Free Ammonia	.062

Nitrogen as Albumenoid Ammonia	.098
Nitrogen as Nitrates	7.04
Nitrogen as Nitrites	Trace
Character of water	Bad

April 30, 1897.

Meadow Branch School. Edward T. Bowers, Owner.

Total residue at 230 degrees Fahrenheit	57.
Ignited residue	16.
Volatile residue	41.
Chlorine	7.6
Nitrogen as Free Ammonia	.155
Nitrogen as Albumenoid Ammonia	.102
Nitrogen as Nitrates	3.6
Nitrogen as Nitrites	Trace
Character of water	Bad

April 30, 1897.

Mountain View School.

Total residue at 230 degrees Fahrenheit	149.
Ignited residue	81.
Volatile residue	67.
Chlorine	4.6
Nitrogen as Free Ammonia	.101
Nitrogen as Albumenoid Ammonia	.078
Nitrogen as Nitrates	1.9
Nitrogen as Nitrites	None
Character of water	Bad

April 30, 1897.

Public Pump, Westminster. W. O. Rinehart, Owner.

Total residue at 230 degrees Fahrenheit	189.
Ignited residue	102.
Volatile residue	87.
Chlorine	22.6
Nitrogen as Free Ammonia	.044
Nitrogen as Albumenoid Ammonia	.075
Nitrogen as Nitrates	5.95
Nitrogen as Nitrites	Trace
Character of water	Bad

April 30. 1897.

Public Well at Westminster. John Burke, Owner.

Total residue at 230 degrees Fahrenheit	331.
Ignited residue	117.
Volatile residue	214.
Chlorine	75.6
Nitrogen as Free Ammonia	.035
Nitrogen as Albumenoid Ammonia	.035
Nitrates	8.99
Nitrites	Trace
Character of water	Bad

April 30, 1897.

Morlock's School. John Royer, Owner.

Total residue at 230 degrees Fahrenheit	154.
Ignited residue	90.
Volatile residue	64.
Chlorine	3.1
Nitorgen as Free Ammonia	.031
Nitrogen as Albumenoid Ammonia	.056
Nitrates	2.6
Nitrites	None
Character of water	Good

April 30, 1897.

Uniontown. O. Fligle, Owner.

Total residue at 230 degrees Fahrenheit	72.
Ignited residue	41.
Volatile residue	31.
Chlorine	4.2
Nitrogen as Free Ammonia	.099
Nitrogen as Albumenoid Ammonia	.032
Nitrates	3.55
Nitrites	None
Character of water	Bad

April 30, 1897.

Bark Hill School. H. T. Eckhard, Owner.

Character of water	Good

April 30, 1897.

Public School at Pipe Creek. Pipe Creek Church, Owner.

Character of water	Good

April 30, 1897.

Springdale School. Walter A. Barnes, Owner.

Character of water	Good

April 30, 1897.

Medford School. Walter Witter, Owner.

Total residue at 230 degrees Fahrenheit	632.
Ignited residue	366.
Volatile residue	266.
Chlorine	102.3
Nitrogen as Free Ammonia	.032
Nitrogen as Albumenoid Ammonia.	.048
Nitrates	12.2
Nitrites	None
Character of water	Bad

Aprll 30, 1897.

Public School of Carrollton. Milton Chew, Owner.

Total residue at 230 degrees Fahrenheit	122.
Ignited residue	67.
Volatile residue	55.
Chlorine	20.3
Nitrogen as Free Ammonia	.053
Nitrogen as Albumenoid Ammonia	.072
Nitrates	8.62
Nitrites	Trace
Character of water	Bad

May 6, 1897.

Sandy Mount School. William Miller, Owner.

Total residue at 230 degrees Fahrenheit	89.
Ignited residue	33.
Volatile residue	56.
Chlorine	7.7
Nitrogen as Free Ammonia	.045
Nitrogen as Albumenoid Ammonia	.071
Nitrates	5.
Nitrites	None
Character of water	Fair

May 6,1897.

Finksburg School. Coon Mann, Owner.

Total residue at 230 degrees Fahrenheit	453.
Ignited residue	195.
Volatile residue	258.

Chlorine	66.1
Nitrogen as Free Ammonia	Trace.
Nitrogen as Albumenoid Ammonia	.057
Nitrates	12.50
Nitrites	None
Character of water	Bad

May 6, 1897.

Gamber Public School. J. Jenkins, Owner.

Character of water .... Good.

May 6,1897.

Public School of Bird Hill. A. T. Buckingham, Owner.

Total residue at 230 degrees Fahrenheit	82.
Ignited residue	40.
Volatile residue	42.
Chlorine	9.3
Nitrogen as Free Ammonia	.057
Nitrogen as Albumenoid Ammonia	.045
Nitrates	3.85
Nitrites	Trace
Character of water	Bad

May 6,1897.

Stonemarket School House. Joseph Gist, Owner.

Character of water .... Good

May 7, 1897.

Warfieldsburg School. John Cushing, Owner.

Character of water .... Good

May 6, 1897.

Western Chapel School. L. I. Squirrell, Owner.

Character of water .... Good

May 6, 1897.

Spring Mills School. Mrs. E. Bankert, Owner.

Total residue	125.
Ignited residue	89.
Volatile residue	36.
Chlorine	3.8
Nitrogen as Free Ammonia	.081
Nitrogen as Albumenoid Ammonia	.078

Nitrates	2.7
Nitrites	None
Character of water	Fair

May 6, 1897.
Free ammonia high, ought to be re-examined.

Mt. Pleasant School. Wm. B. Hull, Owner.

Total residue at 230 degrees Fahrenheit	329.
Ignited residue	275.
Volatile residue	54.
Chlorine	75.7
Nitrogen as Free Ammonia	.054
Nitrogen, Albumenoid Ammonia	.094
Nitrates	5.
Nitrites	Present
Character of water	Bad

May 8th, 1897.

Union Mills School. George Geiser, Owner.

Total residue at 230 degrees Fahrenheit	176.
Ignited residue	120.
Volatile residue	56.
Chlorine	32.8
Nitrogen as Free Ammonia	.042
Nitrogen as Albumenoid Ammonia	.045
Nitrates	9.75
Nitrites	None
Character of water	Bad

Remarks; High Chlorine, Nitrates, Ammonia. Some other supply should be used.
May 8, 1897.

Silver Run School House. Jacob Koontz, Owner.

Total residue at 230 degrees Fahrenheit	89.
Ignited residue	52.
Volatile residue	37.
Chlorine	22.1
Nitrogen as Free Ammonia	.039
Nitrogen as Albumenoid Ammonia	.081
Nitrates	1.85
Nitrites	Trace
Character of water	Bad

Remarks: High chlorine and nitrites. Another supply should be sought.
May 8, 1897.

Pleasant Grove School. Levi Morter, Owner.

Total residue at 230 degrees Fahrenheit	142.
Ignited residue	50.
Volatile residue	92.
Chlorine	3.1
Nitrogen as Free Ammonia	.027
Nitrogen as Albumenoid Ammonia	.039
Nitrates	3.30
Nitrites	None
Character of water	Good

May 8, 1897.

Humbert's School. William Humbert, Owner.

Character of water	Good

May 8, 1897.

Cherry Grove. David Earhardt, Owner.

Character of water	Good

May 8, 1897.

Cranberry School. George A. Schaeffer, Owner.

Total residue at 230 degrees Fahrenheit	117.
Ignited residue	83.
Volatile residue	34.
Chlorine	20.7
Nitrogen as Free Ammonia	.04
Nitrogen as Albumenoid Ammonia	.06
Nitrates	5.
Nitrites	Trace
Character of Water	Bad

Remarks: High chlorine, nitrates, nitrites and free ammonia.

May 8, 1897.

Stonesifer School. William D. K. Lease, Owner.

Character of water	Good

May 8, 1897.

Snyder's School. Noah Brown, Owner.

Total residue at 230 degrees Fahrenheit	55.
Ignited residue	33.
Volatile residue	22.
Chlorine	3·3

Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.09
Nitrates	3.8
Nitrites	Trace
Character of water	Bad

Remarks: The nitrites present show that there is seepage direct into the well. It is certainly unsafe to drink water from a well when the privy is five yards away.

May 8, 1897.

West End School, Westminster. Emanuel Stoner, Owner.

Total residue at 230 degrees Fahrenheit	152.
Ignited residue	104.
Volatile residue	48.
Chlorine	23.2
Nitrogen as Free Ammonia	.040
Nitrogen as Albumenoid Ammonia	.042
Nitrates	710
Nitrites	Trace
Character of water	Bad

Remarks: High nitrites and chlorine. City supply should be put in.

May 8, 1897.

Cecil County.

11 Examinations—5 private supplies; all bad.

6 public supplies, as follows:

Maryland Water Co. Filtered from Big Elk Creek.

Total residue	91.
Chlorine	16.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.218
Nitrates	.8
Nitrites	Trace
Character of water	Bad

July 12th, 1897.

Elkton Town Supply.

Total residue	61.
Ignited residue	37.
Volatile residue	24.
Chlorine	5.8
Nitrogen as Free Ammonia	.08

Nitrogen as Albumenoid Ammonia	.16
Nitrates	1.55
Nitrites	Trace

Remarks: If this sample represents the town supply, it is in very bad condition, perhaps due to a neglect in flushing mains.

April 2, 1897.

Maryland Water Company. (Artesian well,) Elkton.

Character of water	Good

July 12, 1897.

Second National Bank, Elkton.

Total residue	571.
Chlorine	45.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	23.
Nitrites	Abundant
Character of water	Bad

July 26, 1897.

Singerly Pulp and Paper Company, Elkton.

Total residue	85.
Chlorine	10.
Nitrogen as Free Ammonia	.080
Nitrogen as Albumenoid Ammonia	.053
Nitrates	5.
Nitrites	Present
Character of water	Bad

Remarks: Condemned on account of bad sanitary surroundings and relatively high amounts of chlorine and nitrates to total solids, also on account of nitrites.

July 26, 1897.

Maryland Water Company, taken at Felton House, Elkton

Character of water	Good

July 26, 1897.

Dorchester County.

6 examinations.
6 public supplies, as follows:

Public Well, High and Muir Streets, Cambridge.

Total residue	578.
Ignited residue	362.
Volatile residue	216.
Chlorine	121.3
Nitrogen as Free Ammonia	.65
Nitrogen as Albumenoid Ammonia	.75
Nitrates	8.33
Nitrites	Present
Character of water	Bad

March 28, 1897.

Public Well, Pine and Cedar Streets.

Total residue	607.
Ignited residue	421.
Volatile residue	186.
Chlorine	164.5
Nitrogen as Free Ammonia	.15
Nitrogen as Albumenoid Ammonia	.31
Nitrates	8.30
Nitrites	Present
Character of water	Bad

March 28, 1897.

Public Well, Washington Street, opposite Slaughterhouse.

Total residue	905.
Ignited residue	462.
Volatile residue	443.
Chlorine	217.4
Nitrogen as Free Ammonia	.16
Nitrogen as Albumenoid Ammonia	.64
Nitrates	22.7
Nitrites	Present
Character of water	Bad

March 28, 1897.

Bell's Well, Cedar and Academy Streets.

Total residue	505.
Ignited residue	322.
Volatile residue	183.

Chlorine	149.5
Nitrogen as Free Ammonia	.10
Nitrogen as Albumenoid Ammonia	.15
Nitrates	6.45
Nitrites	Present
Character of water	Bad

March 28, 1897.

Public Well.

Total residue	474.
Ignited residue	231.
Volatile residue	243.
Chlorine	81.5
Nitrogen as Free Ammonia	.11
Nitrogen as Albumenoid Ammonia	.16
Nitrates	16.12
Nitrites	Present
Character of water	Bad

March 28, 1897.

Artesian Well, City Supply, Cambridge.

Character of water	Good

Remarks: With the exception of No. 6, all of the surroundings are very bad. They should be closed.

Frederick County.

4 Examinations—4 private supplies. 2 good; 1 bad; 1 fair.

Howard County.

99 Examinations—43 private supplies. 8 good; 31 bad; 1 suspicious; 3 doubtful.

56 public supplies, as follows:

Masonic Hall, Elkridge.

Total residue at 230 degrees Fahrenheit	219.
Chlorine	56.7
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.059
Nitrates	8.33
Nitrites	Trace
Character of water	Bad

May 19, 1897.

St. Augustine's Church, Elkridge.

Total residue at 230 degrees Fahrenheit	188.
Ignited residue	106.
Volatile residue	82.
Chlorine	28.8
Nitrogen as Free Ammonia	.113
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	Trace
Nitrites	None
Character of water	Very bad

May 28, 1897.

Public Schools in Howard County.

School No. 4, Ellicott City. Nathan Jones, Owner.

Total residue at 230 degrees Fahrenheit	122.
Chlorine	8.6
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	None
Nitrites	Considerable amount
Character of water	Bad

June 22, 1897.

School No. 5, Alberton. District No. 2, City Water.

Total residue at 230 degrees Fahrenheit	58.
Chlorine	5.4
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	3.
Nitrites	Trace
Character of water	Good

June 22, 1897.

School No. 3, Pine Orchard. John H. Ridgely, Owner.

Total residue at 230 degrees Fahrenheit	76.
Chlorine	9.2
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	2.25
Nitrites	Trace
Character of water	Bad

June 22, 1897.

Public School No. 1, District No. 2. John Gerwig, Owner.

Character of water	Good

June 22, 1897.

Public School No. 6, District No. 2. Thomas Linthicum, Owner.

Total residue at 230 degrees Fahrenheit	117.
Amount of Chlorine	13.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	2.75
Nitrites	Trace
Character of water	Bad

June 22, 1897.

Schools Nos. 1, 2, 7 and 8, Ellicott City. W. I. Widerman, Owner.

Total residue at 230 degrees Fahrenheit	315.
Amount of Chlorine	31.3
Nitrogen as Free Ammonia	.023
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	10.
Nitrites	Trace
Character of water	Bad

June 2, 1897.

School No. 5, District No. 4. J. Warfield, Owner.

Total residue	62.
Chlorine	9.6
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	3.5
Nitrites	None
Character of water	Fair

June 28, 1897.

School No. 9, District No. 4. John W. Ward, Owner.

Character of water	Good

June 28, 1897.

School No. 3, District No. 4. William Miles, Owner.

Character of water	Good

June 28, 1897.

School No. 6, District No. 4. Dennis Gaither, Owner.

Character of water	Good

June 28, 1897.

School No. 7, District No. 4. Harry Hobbs, Owner.

Total residue	64.
Chlorine	3.6
Nitrogen as Free Ammonia	.065
Nitrogen as Albumenoid Ammonia	.062
Nitrates	2.50
Nitrites	None
Character of water	Bad

June 28, 1897.

School No. 1, District No. 4. G. Buck, Owner.

Total residue	40.
Chlorine	4.1
Nitrogen as Free Ammonia	.041
Nitrogen as Albumenoid Ammonia	.042
Nitrates	1.
Nitrites	None
Character of water	Bad

June 28, 1897.

School No. District No. 5, (Colored.) Samuel Gaither, Owner.

Character of water	Good

June 28, 1897.

School No. 1, Ellicott City. I. Wosch, Owner.

Total residue at 230 degrees Fahrenheit	129.
Chlorine	6.6
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	1.75
Nitrites	Trace
Character of water	Bad

June 22, 1897.

Public School No. 6, Woodstock. Charlie Durner. Owner.

Character of water	Good

June 22, 1897.

Public School No. 3, Marriottsville. William Davis, Owner.

Character of water	Good

June 22, 1897.

Public School No. 1, Alpha. B. F. Shipley, Owner.

Character of water	Good

June 22, 1897.

Alpha Public School. A. McLane, Owner.

Character of water	Good

June 22, 1897.

Public School No. 8, District No. 3. Richard F. Burgess, Owner.

Character of water	Good

June 22, 1897.

Public School No. 2, Sykesville. Marion Hugg, Owner.

Total residue at 230 degrees Fahrenheit	195.
Amount of Chlorine	29.8
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	0.36
Nitrates	10.9
Nitrites	None
Character of water	Bad

June 22, 1897.

School No. 4, District No. 3. John T. Boidgley, Owner.

Character of water	Good

June 22, 1897.

School No. 2, Alpha. B. H. Amos, Owner.

Character of water	Good

June 22, 1897.

School No. 5, Ivory. John W. Selby, Owner.

Character of water	Good

June 22, 1897.

School No. 8, District No. 4. Jos. B. Day, Owner.

Total residue at 230 degrees Fahrenheit	38.
Chlorine	5.9
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.042
Nitrates	Trace
Nitrites	Trace
Character of water	Bad

June 22, 1897.

School No. 9, District No. 3.

Total residue at 230 degrees Fahrenheit	76.
Chlorine	3.1
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.035
Nitrates	2.45
Nitrites	None
Character of water	Good

June 22, 1897.

School No. 4, District No. 4. William H. Hobbs, Owner.

Total residue at 230 degrees Fahrenheit	76.
Chlorine	12.7
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.042
Nitrates	7.6
Nitrites	None
Character of water	Bad

June 28, 1897.

Schoel No. 3, District No. 4. John Bond, Owner.

Total residue	192.
Chlorine	50.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.03
Nitrates	8.45
Nitrites	None
Character of water	Bad

June 28, 1897.

School No. 2, District No. 4. William Picket, Owner.

Total residue	50.
Chlorine	4.3
Nitrogen as Free Ammonia	.060
Nitrogen as Albumenoid Ammonia	.015
Nitrates	3.55
Nitrites	None
Character of water	Suspicious

June 28, 1897.

School No. 2, District No. 4. John L. Tracy, Owner.

Total residue	46.
Chlorine	6.5
Nitrogen as Free Ammonia	Trace

Nitrogen as Albumenoid Ammonia	Trace
Nitrates	4.00
Nitrites	None
Character of water	Fair

June 28, 1897.

School No. 1, District No. 4. David H. Murray, Owner.

Total residue	54.
Chlorine	4.7
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	3.95
Nitrites	Good

June 28, 1897.

School No. 1, District No. 5. Jesse Lyse, Owner.

Character of water .... Good
June 28, 1897.

School No. 2, District No. 5. John Lethbridge, Owner.

Character of water .... Good
June 28, 1897.

School No. 2, District No. 5. Mrs. M Hopkins, Owner.

Character of water .... Good
June 28, 1897.

School No. 2, District No. 5. Noah Harding, Owner.

Character of water .... Good
June 28, 1897.

School No. 3, District No. 5. Frank Hnevsa, Owner.

Character of water .... Good
June 28, 1897.

School No. 4, District No. 5. Richard Owings, Owner.

Character of water .... Good
June 28, 1897.

School No. 7, District No. 5. Thos. Maynard, Owner.

Total residue	184.
Chlorine	31.2
Nitrogen as Free Ammonia	Trace

Nitrogen as Albumenoid Ammonia	Trace
Nitrates	7.49
Nitrites	Trace
Character of water	Bad

June 28, 1897.

School No. 3, Dtstrict No. 5. Robt. Williams, Owner.

Character of water.. Good

June 28, 1897.

School No. 7, Districl No. 6. Morton Whips, Owner.

Character of water.. Good

June 28, 1897.

School No. 4, District No. 6. William Whips, Owner.

Total residue	106.
Chlorine	3.4
Nitrogen as Free Ammonia	.081
Nitrogen as Albumenoid Ammonia	.027
Nitrates	3.3
Nitrites	None
Character of water	Suspicious

June 28, 197.

St. Charles College.

Character of water.. Good

June 29, 1897.

School No. 3, District No. 1. John G. Miller, Owner.

Total residue	128.
Chlorine	10.9
Nitrogen as Free Ammonia	.027
Nitrogen as Albumenoid Ammonia	.015
Nitrates	4.9
Nitrites	None
Character of water	Bad

July 3, 1897.

School No. 6, District No. 6. Charles H. Dieson, Owner.

Character of water.. Good

July 3, 1897.

School No. 3, District No. 6. J. Sacks, Owner.

Total residue	138.
Chlorine	3.1
Nitrogen as Free Ammonia	.027
Nitrogen as Albumenoid Ammonia	.030
Nitrates	Trace
Nitrites	Trace
Character of water	Bad

July 3, 1897.

School No. 1, District No. 6. George Crawford, Owner.

Character of water	Good

July 3, 1897.

School No. 1, District No. 6. James Smith, Owner.

Total residue	180.
Chlorine	32.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	3.4
Nitrites	None
Character of water	Bad

July 3, 1897.

School No. 2, District No. 6. C. Gorman, Owner.

Character of water	Good

July 3, 1897.

School No. 5, District No. 6. Henry Hegeman, Owner.

Character of water	Good

July 3, 1897.

School No. 2, District No. 6. George Harvey, Owner.

Total residue	52.
Chlorine	2.9
Nitrogen as Free Ammonia	.083
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	Trace
Nitrites	None
Character of water	Bad

July 3, 1897.

School No. 2, District No 1. E. Williams, Owner.

Character of water	Good

July 3, 1897.

School No. 5, District No. 1. Geo. L. Baker, Owner.

Character of water	Good

July 3, 1897.

School No. 1, District No. 1. M. Gray, Owner.

Total residue	78.
Chlorine	3.1
Nitrogen as Free Ammonia	.105
Nitrogen as Albumenoid Ammonia	.063
Nitrates	3.35
Nitrites	Trace
Character of water	Bad

July 3, 1897.

School No. 1, District No. 1. Geo. Horman, Owner.

Character of water	Good

July 3, 1897.

School No. 4, District No. 1. Wm. Rider, Owner.

Character of water	Good

July 3, 1897.

School No. 2, District No. 1. Mrs. McCauley, Owner.

Total residue	269.
Chlorine	44.1
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.05
Nitrates	8.33
Nitrites	Trace
Character of water	Bad

July 3, 1897.

Kent County.

13 Examinations—6 private supplies; all bad.
7 public supplies, as follows:

Pool of the Chestertown Water Works, Chestertown.

Total residue	85.
Ignited residue	31.
Volatile residue	54.
Chlorine	12.1
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	4.9
Nitrites	None

September 8, 1896.

Reservoir of the Chestertown Water Works, Chestertown.

Total residue	62.
Ignited residue	17.
Volatile residue	45.
Chlorine	12.1
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.03
Nitrates	4.1

September 8, 1896.

Sample No. 4, Chestertown.

Total residue	81.
Ignited residue	24.
Volatile residue	57.
Chlorine	11.7
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	2.6
Nitrites	None
Character of water	Fair

September 28, 1896.

Sample No. 6, Chestertown.

Total residue	549.
Ignited residue	176.
Volatile residue	393.
Chlorine	108.
Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.06
Nitrates	16.7
Character of water	Bad

September 28, 1896.

Sample No. 1, Chestertown.

Total residue	75.
Ignited residue	21.
Volatile residue	54.
Chlorine	12.6
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	1.3
Character of water	Suspicious

September 28, 1896.

Sample No. 8, Chestertown.

Total residue	179.
Ignited residue	44.
Volatile residue	135.
Chlorine	28.1
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.03
Nitrates	9.9
Character of water	Bad

September 28, 1896.

Sample No. 9, Chestertown.

Total residue	896.
Ignited residue	499.
Volatile residue	397.
Chlorine	222.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.08
Nitrates	16.
Nitrites	None
Character of water	Bad

September 28, 1896.

Sample No. 5, Chestertown.

Total residue	74.
Ignited residue	32.
Volatile residue	42.
Chlorine	15.4
Nitrogen as Free Ammonia	.04
Nitrogen as Albumenoid Ammonia	.03
Nitrates	1.4
Nitrites	None
Character of water	Bad

September 28, 1896.

Sample No. 2, Chestertown.

Total residue	844.
Ignited residue	410.
Volatile residue	434.
Chlorine	236.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.06
Nitrates	16.1
Character of water	Bad

September 28, 1896.

Sample No. 3, Chestertown.

Total residue	112.
Ignited residue	48.
Volatile residue	74.
Chlorine	18.2
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.03
Nitrates	5.1
Character of water	Bad

November 28, 1896.

Sample No. 7, Chestertown.

Total residue	157.
Ignited residue	60.
Volatile residue	97.
Chlorine	23.8
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	9.6
Character of water	Bad

September 28, 1896.

BALTIMORE, September 29, 1896.

DR. JAS. A. STEUART,

Secretary State Board of Health,

No. 10 South Street, Baltimore, Md.

DEAR SIR:

Mr. Mitten and I visited Chestertown on September 18, according to your instructions, and made an inspection of the town with reference to its water supply.

Sample No. 1. Upper pool. Reservoir 20 feet in diameter, 10 feet deep. Water clear and cold. Soil sand. Surrounded by houses, the nearest being about thirty yards away. The condition of water suspicious.

Sample No. 2. Well used by Mrs. Lewis. Sanitary condition bad. One case of typhoid fever in the house. This well and house are directly in the valley in which both pools are situated. Surroundings of well very dreadful. Condition of water bad.

Sample No. 3. Well at house occupied by Mrs. Tucker, whose sister is ill from typhoid fever. Well 18 feet deep. Water closet is merely a house over a pile of excrement 23 feet away. Mrs. Lewis' family use the well for drinking purposes at times. Condition of water bad.

Sample No. 4. Spring in middle of valley, around which it is proposed to make another pool. The spring is situated midway between the two pools now in use. Sanitary surroundings in the immediate neighborhood good. The water in the valley is, however, evidently laden with products of decomposition, and the water can be classed as "fair" only.

Sample No. 5. From lower pool. This is close to the water, and at the end of the valley. Sanitary surroundings in the immediate neighborhood bad. Condition of water bad.

Sample No. 6. Well on street running from bridge called by some Maple avenue, and by others Bridge street. Sanitary surroundings very bad. Well 50 feet deep. In the immediate neighborhood is a pool of dirty water, some of which runs back into the well. About 13 families use this well. No inquiry was made for cases of sickness. Condition of water bad.

Sample No. 7. Thomas Larsen's well. Used by all the neighbors. Sanitary surroundings good. Condition of water bad.

Sample No. 8. Public well, Calvert and Kent streets. This well is in the negro quarter. Surroundings bad. Water flows back into well. Condition of water bad.

Sample No. 9. Well on Cannon street. Used by about 13 families. Sanitary surroundings bad. Water seeps into well. Condition of water bad. The well is only 10 feet deep.

General Remarks.

The general sanitary condition of Chestertown is something so bad, that words can hardly give an idea of the condition

prevailing in parts of the town. Mr. Mitten and I made no systematic examination, but saw enough to convince us both, that there is urgent need for sanitary inspections and regulations throughout a great portion of the town. In the course of our inspection of the water supply, we had occasion to visit the slaughterhouses, both ot which were in a filthy state. Green hides, trimmings, hoofs, bones, offal with maggots in it were found without looking for them, exposed and open to any casual visitor. Properly speaking, I am aware, that these few notes are not germane to a water inspector, but I have been compelled to allude to them in order to draw the attention of the Board to the urgent needs of this beautiful and picturesque town.

The sewerage system of the town should be extended to at least all the land which drains into the water shed. No pig-pens or stables should be allowed over the same area, and as much as possible of the valley in which the pools are situated should be owned by the company and kept in clean condition.

I must add in conclusion, that Mr. Mitten agrees with me in the above report, and I have only put the opinions of both of us in writing.

W. B. D. PENNIMAN,
Analyst State Board of Health.

BACTERIOLOGICAL EXAMINATION.

September 28, 1896.

PROF. W. B. D. PENNIMAN,
Chemist of State Board of Health.

DEAR SIR: I respectfully submit my report upon the bacteriological examination of the water given me by yourself from the ponds of Chestertown.

Pond I showed such slight evidence of gas formation in the fermentation tubes, that it was quite evident that there were no colon-bacilli (intestinal bacteria) present.

Pond II contained 1906 colonies to the cubic centimeter.

One cubic centimeter of water was placed in glucose, lactose, and sacharose bouillon, and the fermentation noted. This was not characteristic of the colon bacillus, but plates were made from the tubes and three varieties of bacilli were isolated and tested culture media and in the fermentation tube. None of these in any way corresponded to the bacillus coli communis.

Ellsner's special medium for typhoid bacilli was also used, but although this work at present is to a certain extent experimental, no typhoid bacilli were found.

Although we were unable to find the intestinal bacteria, yet the presence of active fermentative bacteria, and the excessive number of bacteria to the cubic centimeter would point to pollution, since unpolluted ground or spring water contains few bacteria, and never any fermentative organisms.

Respectfully submittted,

Wm. Royal Stokes, M. D.

Montgomery County.

18 Examinations—6 private supplies. 4 good; 2 bad.
12 public supplies, as follows:

Cassidy's School, Forest Glen.

Character of water	Good

November 24, 1896.

Haar Lake, Forest Glen (Lower Lake.)

Character of water	Good

Remarks: The albumenoid ammonia is evidently of vegetable origin. Water so impregnated, often give rise to malaria, but is nevertheless used after standing to allow the sediment to subside.

November 24, 1896.

Haar Lake, Forest Glen (Upper Lake.)

Color	Cloudy
Total residue.	76.
Ignited residue	26.
Volatile residue	50.
Chlorine	2.8
Nitrogen as Free Ammonia	.21
Nitrogen as Albumenoid Ammonia	.27
Nitrates	Trace
Nitrites	None
Character of water	Bad

Remarks: The presence of so much free ammonia must condemn this water, as active decomposition is indicated as actnally going on.

November 24, 1896.

Stream at Proctor's Lower Lake, Forest Glen.

Character of water.. Good
December 8, 1896.

Stream Emptying into Proctor's Upper Lake, Forest Glen.

Character of water.. Good
December 6, 1896.

Stream From Lower Lake below Culvert, Forest Glen.

Total residue	64.
Ignited residue	43.
Volatile residue	21.
Chlorine	3.4
Nitorgen as Free Ammonia	.07
Nitrogen as Albumenoid Ammonia	.08
Nitrates	Trace
Nitrites	None
Character of water	Bad

December 9, 1896.

Cassidy's School Laundry Supply, Forest Glen.

Total residue	53.
Ignited residue	28.
Volatile residue	25.
Chlorine	5.
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.05
Nitrates	None
Nitrites	None
Character of water	Unfit for drlnking purposes

December 9, 1896.

Spring Near Forest Glen Station.

Total residue	121.
Ignited residue	47.
Volatile residue	74.
Chlorine	22.2
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	.04
Nitrates	Trace
Nitrites	None
Character of water	Suspicious

December 9, 1896.

Spring Supplying Cassidy's School, Forest Glen.

Character of water	Good

December 9, 1896.

From a Branch Between the National Park Seminary Grounds on the West and Dr. Wright's Property on the East, Forest Glen.

Total residue	114.
Ignited residue	64.
Volatile residue	50.
Chlorine	10.9
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.08
Nitrates	None
Nitrites	None
Character of water	Bad

January 15, 1897.

Carroll Spring Branch, just East of the B. & O. R. R. Track, Forest Glen.

Total residue	71.
Ignited residue	43.
Volatile residue	28.
Chlorine	3.6
Nitrogen as Free Ammonia	.04
Nitrogen as Albumenoid Ammonia	.05
Nitrates	.2
Nitrites	Trace
Character of water	Bad

January 15, 1897.

Carroll Springs, Branch on National Park Seminary Grounds, Forest Glen.

Character of water	Good

January16, 1897.

BACTERIOLOGICAL EXAMINATION.

November 30, 1896.

DR. JOHN S. FULTON,

Secretary of State Board of Health, Maryland.

DEAR SIR: I respectfully beg leave to submit my bacteriological report upon the water taken from No. 1 stream running into Rock creek, No. 2 College spigot, No. 3 lower lake, No. 4 upper lake, Forest Glen.

No. 1. Microscopic sediment. Few motile animalculæ. Genus infusoria. Species, monas. No microscopic plants (algæ and diatoms.) Colonies, per cubic centimeter, 800. Large quantities of water, 50 cubic centimeters, were tested for the presence of the bacillus coli communis, but with negative results. Other fermentative bacteria were present.

No. 2. Few algæ. Colonies, per cubic centimeter, 980. Many colonies of the bacillus coli communis developed from 50 cubic centimeters of water.

Nos. 3 and 4. Few algæ.

No. 3. Colonies, per cubic centimeter, 116.

No. 4. Colonies, per cubic centimeter, 160.

No evidence of the bacillus coli communis in Nos. 3 and 4.

From the above report it will be seen that Nos. 1, 3 and 4 are bacteriologically clean. The presence of the colon bacillus alone in large quantities of drinking water is only suggestive, and should lead, as of course you know, to an inspection and abatement of the nuisance, if possible.

In combination with an unfavorable chemical report the water should, of course, be condemned.

Very respectfully,

WM. ROYAL STOKES, M. D.

December 20, 1896.

DR. JOHN S. FULTON,

Secretary of State Board of Health, Maryland.

DEAR SIR: I beg leave to submit the report upon the bacteriological examination of the following waters, received on December 12, 1897:

No. 1. Stream emptying into lower lake, Forest Glen.
No. 2. Stream emptying into upper lake, Forest Glen.
No. 3. Stream below culvert.
No. 4. Stream supplying Cassidy's well.
No. 5. Spring supplying small houses.
No. 6. Cassidy's spring.

Microscopic sediment. All contain a few algæ and diatoms, but no animalculæ. No. 1, 935. No. 2, 250. No. 3, 173. No. 4, 1238. No. 5, 1305. No. 6, 205.

All of the waters were examined for the presence of the bacillus coli communis in as small a quantity as 0.5 of a cubic centimeter, and in as large a quantity as 50 cubic centimeters. No intestinal bacteria were found except in water No. 4, stream supplying Cassidy's well. The bacilli coli communis was demonstrated in as small a quantity as 0.5 of a cubic

centimeter. This, combined with an unfavorable chemical examination, renders the water unfit for use. No. 5, containing 1305 colonies per c. c., is rather high, but as no colon bacilli were present, we cannot condemn it.

No. 1. Good.
No. 2. Good.
No. 3. Good.
No. 4. Bad.
No. 5. Good (?).
No. 6. Good.

Respectfully submitted,

Wm. Royal Stokes, M. D.

Prince George's County.

3 examinations—3 private. All good.

Somerset County.

1 examination—private. Bad.

S. W. Dana, Crisfield.

Total residue	805.
Ignited residue	652.
Volatile residue	153.
Chlorine	106.2
Nitrogen as Free Ammonia	.17
Nitrogen as Albumenoid Ammonia	.26
Nitrates	Trace
Nitrites	None
Character of water	Unfit for use

March 3, 1897.

Talbot County.

16 Examinations—All public supplies, as follows.

Public Schools.

Easton.

Total residue	306.
Chlorine	21.8
Nitrogen as Free Ammonia	.10
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	None
Nitrites	None

Leed's Creek.

Total residue	154.
Chlorine	42.8
Nitrogen as Free Ammonia	.07
Nitrogen as Albumenoid Ammonia	.07
Nitrates	.6
Nitrites	Large amount

Peach Blossom.

Total residue	94.
Chlorine	5.9
Nitrogen as Free Ammonia	None
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	3.20
Nitrites	Trace

St. Michael's.

Total residue	388.
Chlorine	89.7
Nitrogen as Free Ammonia	None
Nitrogen as Albumenoid Ammonia	.07
Nitrates	3.35
Nitrites	None

Cordova.

Total residue	18.
Chlorine	5.1
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.03
Nitrates	2.70
Nitrites	None

Bruceville.

Total residue	60.
Chlorine	16.1
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.06
Nitrates	.5
Nitrites	Large amount

Landing Neck.

Total residue	54.
Chlorine	6.9

Nitrogen as Free Ammonia	None
Nitrogen as Albumenoid Ammonia	.06
Nitrates	Trace
Nitrites	None

Cambridge Ferry Neck.

Total residue	90.
Chlorine	9.8
Nitrogen as Free Ammonia	.01
Nitrogen as Albumenoid Ammonia	.07
Nitrates	4.80
Nitrites	None

June 6, 1897.

Hayland.

Total residue	211.
Chlorine	6.4
Nitrogen as Free Ammonia	.03
Nitrogen as Albumenoid Ammonia	.083
Nitrates	2.9
Nitrites	None

Kirkham.

Total residue	347.
Chlorine	22.
Nitrogen as Free Ammonia	2.03
Nitrogen as Albumenoid Ammonia	.057
Nitrates	Trace
Nitrites	Trace
Character of water	Bad

Tunis Mills.

Total residue at 230 degrees Fahrenheit	301.
Chlorine	76.
Nitrogen as Free Ammonia	.063
Nitrogen as Albumenoid Ammonia	.039
Nitrates	10.1
Nitrites	Large amount
Character of water	Bad

Double Mills.

Total residue	202.
Chlorine	67.
Nitrogen as Free Ammonia	.03

Nitrogen as Albumenoid Ammonia	.06
Nitrates	2.8
Nitrites	Trace
Character of water	Bad

Hambleton.

Total residue	169.
Chlorine	26.
Nitrogen as Free Ammonia	Trace
Nitrogen as Albumenoid Ammonia	Trace
Nitrates	9.96
Nitrites	None

Island Creek Neck.

Total residue	551.
Chlorine	75.
Nitrogen as Free Ammonia	Trace
Albumenoid Ammonia	.065
Nitrates	Trace
Nitrites	None

Tilghman's Island.

Character of water	Good

Poplar Island.

Total residue	286.
Chlorine	65.
Nitrogen as Free Ammonia	.057
Nitrogen as Albumenoid Ammonia	.066
Nitrates	Trace
Nitrites	Trace
Character of water	Bad

June 22, 1897.

For want of sanitary surveys, judgment is not expressed concerning some of these waters. The water supplies of the public schools at Leed's creek, Bruceville, Hambleton and Island creek are probably bad.

Washington County.

6 Examinations—3 private supplies. All good.
3 public supplies, as follows:

From Reservoir of Hagerstown.

Character of water.. Good
August 11, 1896.

From Pipes at Extreme West End of Hagerstown.

Character of water.. Good
August 11, 1896.

From Pipes in Center of Hagerstown.

Character of water.. Good
August 11, 1896.

WICOMICO COUNTY.

7 Examinations—2 private supplies. 1 good; 1 bad.
5 public supplies, as follows:

Salisbury Water Company.

Total residue	151.
Ignited residue	44.
Volatile residue	107.
Chlorine	23.1
Nitrogen as Free Ammonia	0.3
Nitrogen as Albumenoid Ammonia	0.3
Nitrates	6.58
Nitrites	None

Remarks: Knowing nothing of the history of this water, it is impossible for me to pronounce in regard to its condition.
February 12, 1897.

Wicomico River at Intake Pipe, Salisbury.

Total residue	49.
Ignited residue	29.
Volatile residue	20.
Chlorine	8.4
Nitrogen as Free Ammonia	.072
Nitrogen as Albumenoid Ammonia	.144
Nitrates	4.
Nitrites	Trace
Character of water	Bad

February 23, 1897.

Pumping Station of Salisbury. (Artesian Well.)

Character of water.. Good
February 23, 1897.

Spigot at Randolph Humphrey's Office, Salisbury. Supply of Salisbury Water Company.

Character of water.. Good
February 23, 1897.

Artesian Well, Salisbury.

Character of water.. Good
February 23, 1897.

March 1, 1897

Dr. John S. Fulton,

Secretary State Board of Health.

Dear Sir: The bacteriological examination of the water from Salisbury gives the following results:

From Wiconico river at intake pipe. Colonies, per cubic centimeter, 2742.

No. 2. Pumping station. Colonies, per cubic centimeter 1042.

No. 3. Spigot at Randolph Humphrey's office.

No. 4. Artesian well on Main St. Practically free from bacteria.

No. 1, or the river water, contains an organism which resembles the bacillus coli communis as far as our tests have proceeded.

Nos. 2, 3 and 4, showed no fermentation in sugar (lactose or milk sugar) bouillon after several days growth in the thermostat at 35 degrees C.

This shows that the river water contains an organism resembling the colon bacillus, and that this organism is not present in the city supply. A positive report as regards the colon bacillus will be forwarded in a day or two.

The difference between the bacterial contents of the artesian well water and the water as it reaches the consumer is probably due to contamination with harmless bacteria in the water mains. The water is good drinking water.

Very respectfully,

Wm. Royal Stokes.

Final Report Upon the Bacteriological Examination of Water from Salisbury.

March 1, 1897.

Dr. John S. Fulton,

Secretary State Board of Health, Maryland.

Dear Sir: The report upon the examination of the four samples of water from Salisbury, Md., is as follows:

No. 1. Wicomico river. Clear, no odor. Microscopic sediment. Animalculæ. Few infusoria of species cercomonas. Plants. Many algæ. No vermes. Colonies, per cubic centimeter, 2742. Bacillus coli communis present in 0.5 cubic centimeters of water. Condition, bad.

No. 2. 1024 per c. c.

No. 3. 1270 per c. c. Few algæ present. Neither specimen contains any intestinal bacteria in small quantities of water. Condition, bad.

No. 4. Gelatine plate absolutely sterile after four days at 23 degrees Centigrade. No fermentation nor bacillus coli communis present in fermentation tube. Condition, very good.

This examination shows that the intestinal bacillus present in the river water is not present in the drinking water. The contamination of the drinking water by harmless bacteria probably takes place in the supply mains or pipes. The artesian well water is practically free from bacteria.

No. 1. River water.
No. 2. Pumping station.
No. 3. Spigot at Mayor Randolph Humphrey's office.
No. 4. Artesian well.

Respectfully submitted,

Wm. Royal Stokes.

Worcester County.

7 Examinations—6 private. All bad.
1 public well, as follows:

Harmonson's Livery Stable, Ocean City.

Total residue	257.
Chlorine	35.
Nitrogen as Free Ammonia	.626
Nitrogen as Albumenoid Ammonia	.096
Nitrates	Trace
Nitrites	None
Character of water	Very bad

Remarks: This sample had an old cork in the bottle.
June 22, 1897.

Vinegars.

Baltimore, February 2, 1897.

In reference to the attached report on vinegars. In the first place it may be well to note the different kinds of vinegar on the market. They are as follows:

1st. Cider vinegar and wine vinegar.

2d. Malt vinegar.

3d. Whiskey vinegar.

4th. Artificial vinegar made by adding acetic acid, obtained from the distillation of wood to water.

The first three are made by treating the cider, malt liquor, or weak spirit (low wines) with yeast after they have undergone alcoholic fermentation. The yeast plant converts the alcohol into acetic acid.

Regarding the article as a condiment the value of the vinegar is dependent on two factors:—First, the amount of acetic acid; second, and more important, the flavor imparted by the amounts of ethereal substances to which the aroma is due.

During the past few years a new process for making vinegar from alcoholic liquids has been devised, the so-called quick vinegar process. In this method of manufacture, the alcoholic liquid is allowed to trickle slowly on birch wood shavings, which have been soaked in strong vinegar, and so become coated with the "mother of vinegar." By this means the process is effected very quickly.

If the process was only used to convert the natural juices of fruits into vinegar, and the products were sold under a name descriptive of their origin, no criticism could be made of this process. It has, however, had the effect of driving cider vinegars, wine vinegars, and malt vinegars from the market, and in their place we have vinegars made from low wines, colored with caramel, and the aromatic flavor either entirely lacking or else sophisticated by artificial essences. It is estimated that fully 90 per cent. of the vinegar on the market is made in this way, and it has proved such a cheap method of manufacture that it has driven from the field the vinegar made directly from acetic acid.

It is not, of course, for me to say whether anything can be done under our present law to prevent the frauds which are being practiced on the consumer by these sophisticators. From the standpoint of a hygienist it is doubtless true that as none of these vinegars were found to contain mineral acids, we cannot stop their sale under our general powers. It would be well, however, if our Board had the authority to expose fraud, as this doubtless is, and follow the example of other States in this particular.

Yours truly,

W. B. D. Penniman, *Analyst.*

Sample Number.	Specific Gravity.	Total Solids.	Ash.	Total Activity.	Color.	Price Per Quart.	Kind of Vinegar.
		Pr.Ct.	Pr.Ct.	Pr.Ct.			
1	1.014	0.71	0.16	5.10	Light Br'n.	$ 13	Malt vinegar.
2	1.011	1.01	0.61	4.60	Light Br'n.	13	Malt vinegar.
3	1.014	2.37	0.58	4.50	Light Br'n.	05	Cider vinegar.
4	1.007	.17	.003	3.84	Brown.	05	Col'd whiskey vinegar.
5	1.007	.25	.008	4.11	Brown.	05	Col'd whiskey vinegar.
6	1.006	.28	.02	2.62	Brown.	04	Col'd whiskey vinegar.
7	1.006	.07	.03	3.54	Colorless.	03	Whiskey vinegar.
8	1.007	.50	.02	3.78	Brown.	03	Col'd whiskey vinegar.
9	1.007	.22	.03	3.69	Brown.	04	Col'd whiskey vinegar.
10	1.009	.29	.02	4.58	Brown.	08	Col'd whiskey vinegar.
11	1.007	.28	.05	3.51	Light Br'n.	03	Col'd whiskey vinegar.
12	1.007	.13	.01	4.08	Colorless.	09	Whiskey vinegar.
13	1.007	.21	.02	3.90	Brown.	09	Col'd whiskey vinegar.
14	1.006	.10	.02	3.61	Colorless.	05	Whiskey vinegar.
15	1·006	.16	.02	3.39	Brown.	03	Col'd whiskey vinegar.
16	1.010	.66	.42	3.62	Light Br'n.	04	Malt vinegar.
17	1.007	.13	·02	4.35	Colorless.	04	Whiskey vinegar.
18	1.006	.05	·002	3.38	Colorless.	03	Whiskey vinegar.
19	1.008	.60	·24	3.13	Light Br'n.	06	Malt vinegar.
20	1.007	.10	.08	3.51	Colorless.	04	Whiskey vinegar.
21	1.006	.18	.01	3.62	Light Br'n.	05	Col'd whiskey vinegar.
22	1.007	.07	.005	3.91	Colorless.	05	Whiskey vinegar.
23	1.007	.38	.05	3.51	Brown.	03	Col'd whiskey vinegar.
24	1.010	.61	.02	3.50	Brown.	03	Col'd whiskey vinegar.
25	1.005	.22	.003	3.47	Brown.	04	Col'd whiskey vinegar.
26	1.011	.26	.006	3.09	Brown.	03	Col'd whiskey vinegar.
27	1.009	.23	.005	3.63	Brown.	05	Col'd whiskey vinegar.
28	1.009	.18	.009	3.54	Brown.	05	Col'd whiskey vinegar.
29	1.018	1.83	.67	4.62	Brown.	06	Malt vinegar.
30	1.008	.13	.02	3.48	Colorless.	05	Whiskey vinegar.
31	1.009	.17	.01	3.37	Brown.	06	Col'd whiskey vinegar.
32	1.010	.21	.13	3.37	Brown.	05	Col'd whiskey vinegar.
33	1.009	.12	.006	3.54	Colorless.	03	Whiskey vinegar.
34	1.008	.19	.007	4.35	Brown.	05	Col'd whiskey vinegar.
35	1.009	.16	.006	4.25	Light Br'n.	03	Col'd whiskey vinegar.
36	1.012	.58	.37	3.59	Brown.	03	Malt vinegar.
37	1.007	.23	.02	3.45	Light Br'n.	03	Col'd whiskey vinegar.
38	1.009	.14	.02	3.82	Colorless.	04	Whiskey vinegar.
39	1.009	.06	.005	3.68	Colorless.	04	Whiskey vinegar.
40	1.008	.19	.005	3 44	Colorless.	03	Whiskey vinegar.
41	1.010	.24	.003	3.68	Light Br'n.	03	Col'd whiskey vinegar.
42	1.008	.08	.007	3.72	Colorless.	03	Whiskey vinegar.
43	1.009	.14	.03	3.25	Colorless.	04	Whiskey vinegar.
44	1.009	.18	.09	3.55	Colorless.	06	Whiskey vinegar.
45	1.008	.08	.02	3.43	Colorless.	04	Whiskey vinegar.
46	1.011	.79	.04	3.48	Brown.	05	Col'd whiskey vinegar.
47	1.007	.18	.04	3.48	Colorless.	04	Whiskey vinegar.
48	1.008	.15	.05	3.59	Colorless.	03	Whiskey vinegar.
49	1.010	.27	.04	5.20	Brown.	03	Col'd whiskey vinegar.
50	1.008	.25	.08	3.51	Brown.	04	Col'd whiskey vinegar.

Sample Number.	Specific Gravity.	Total Solids.	Ash.	Total Activity.	Color.	Price Per Quart.	Kind of Vinegar.
		Pr.Ct.	Pr.Ct.	Pr.Ct.			
51	1.010	.27	.05	3.68	Brown.	04	Col'd whiskey vinegar.
52	1.009	.32	.12	3.41	Brown.	05	Col'd whiskey vinegar.
53	1.008	.28	.09	2.64	Brown.	05	Col'd whiskey vinegar.
54	1.008	.16	.01	3.85	Brown.	05	Col'd whiskey vinegar.
55	1.009	.20	.04	3.57	Brown.	05	Col'd whiskey vinegar.
56	1.009	.29	.05	3.59	Brown.	03	Col'd whiskey vinegar.
57	1.008	.08	.02	3.23	Colorless.	02	Whiskey vinegar.
58	1.008	.08	.02	3.23	Colorlees.	03	Whiskey vinegar.
59	1.011	.44	.22	3.50	Brown.	04	Malt vinegar.
60	1.007	.14	.04	3.69	Colorless.	03	Whiskey vinegar.
61	1.009	.21	.02	3.68	Brown.	04	Col'd whiskey vinegar.
62	1.008	.19	.007	3.83	Colorless.	04	Whiskey vinegar.
63	1.010	.20	.11	3.62	Light Br'n.	04	Col'd whiskey vinegar.
64	1.007	.43	.09	3.55	Colorless.	04	Whiskey vinegar.
65	1.007	.27	.01	3.62	Light Br'n.	04	Col'd whiskey vinegar.
66	1.006	.13	.018	3.43	Colorless.	04	Whiskey vinegar.
67	1.009	.23	.008	3.85	Brown.	05	Col'd whiskey vinegar.
68	1.007	.25	.015	3.65	Light Br'n.	04	Col'd whiskey vinegar.
69	1.008	.38	.12	3.53	Brown.	04	Col'd whiskey vinegar.
70	1 006	.28	.04	2.77	Light Br'n.	04	Col'd whiskey vinegar.

Grape Juice.

Baltimore, February 3, 1897.

John S. Fulton, M. D.,

Secretary State Board of Health,
No. 10 South street, City.

Dear Sir: I have examined the following food product: "Dr. Welch's Grape Juice, from Choicest Concord Grapes, the Welch Grape Juice Company, Vineland, New Jersey, J. Lanahan agent, No. 118 E. Baltimore street" The descriptive label is attached.

The product contains no alcohol, but is highly charged with salicylic acid. The color is in part artificial.

Yours truly,

W. B. D. Penniman, *Analyst.*

[COPY OF THE LABEL.]

Dr. Welch's Grape Juice.

This grape juice, pure and unfermented, is grape food—a nutritious fluid for both the sick and well.

The color of this juice is from the dark, purple under-skin of the Concord grape; and here, by our own process, is also obtained the richness and strong grape aroma and flavor.

Dr. Welch's grape juice is especially recommended in typhoid fever, pneumonia, pleuritus, peritonitis, rheumatism, for lying-in-patients, and for all forms of chronic diseases, except diabetes melitus; for aphasia, pernicious anæmia, and the milder forms of this disease, it is remarkably efficacious.

For the sick, use from full strength down to one part grape juice to three parts water, being governed by choice of patient. In acute diseases the patient should take all that can be borne, beginning with wine-glass, say every two or three hours. In anæmia, a half pint a day for a week, then a pint a day.

For the Sacrament, to each quart add one or two tumblers of cold water.

After being opened it will keep sweet for a long time in a cool place. Never changes while sealed.

For all purposes, have the grape juice cold.

BALTIMORE, February 8, 1897.

I have made a quantitative examinantion of Dr. Welch's Grape Juice, and find that it contains in each fluid ounce .03653 gr. salicylic acid.

1 pt. (16 oz.) .5846 gr.

1 qt. (32 oz.) 1.1692 gr.

1 gal. 4.6768 gr.

The methods for the determination of salicylic acid are not very exact, but they err in falling below the full amount present. Making our deductions on the basis of .6 of a grain to the pint, we find that in cases of Anemia, that this amount of salicylic acid is given in addition to the other drugs that may be prescribed. (See label.) "A commission appointed by the Academy of Medicine of Paris, at the suggestion of the Minister of Agriculture, reported that it is proved that the prolonged employment of even very small quantities of salicylic acid is dangerous, and that in susceptible individuals, especially in aged persons, it is apt to cause disorder of digestion and disease of the kidneys." (H. C. Woods, Therapeutics, page 621, edition 1889.)

Yours very truly,

W. B. D. PENNIMAN, *Analyst.*

BALTIMORE, April 3, 1897.

I have examined a sample of Boericke and Tafel's Pure Grape Juice Unfermented. It contains no salicylic acid or other preservative. This is of interest, as we have examined one other sample that contained preservative.

W. B. D. PENNIMAN, *Analyst.*

EXAMINATIONS OF MALT LIQUORS.

BALTIMORE, April 6, 1897.

I enclose complete analyses of the 12 beers sent here for test. Below you will find the average composition of these beers compared with the average composition of beer as determined by the U. S. Department of Agriculture and reported in Bulletin No. 13, August 15, 1887. We have used the methods of the Department in my analyses.

AVERAGE COMPOSITION.	ALCOHOL BY WEIGHT.	TOTAL SOLIDS.	ASH.	MALT SUGAR.	ALBUMENOIDS.	PHOSPHORIC ACID.
Dept. of Agricult.	4.63	5.53	.279	1.65	.563	.077
Baltimore beer....	4.03	5.90	.171	1.25	.591	.062

These figures have nothing directly to do with the health of the persons drinking the beer, but only go to show that so far as food value is concerned, Baltimore beers are about the average in value.

Three of the samples contain salicylic acid. The use of this substance as a preservative should be forbidden. If the Board has authority, I wonld recommend that the use of this or other preservatives be forbidden.

W. B. D. PENNIMAN, *Analyst.*

BALTIMORE, April 28, 1897.

In accordance with instructions of the Board, I have examined the following samples of malt liquors:

Sample Number.	Specific Gravity.	Alcohol by Weight.	Alcohol by Volume.	Extract (Total Solids.)	Ash.	Reducing Sugar.	Dextrin.	Albumenoids.	Phosphoric Acids.	Salicylic Acid.
1	1.014	4.62	5.78	5.37	.13	1.6	3.10	.538	.049	None
2	1.013	4.62	5.78	5.56	.119	1.3	3.66	.475	.056	Present
3	1.014	......	......	5.17	.159	1.3	3.12	.595	.059	None
4	1.014	4.94	6.17	5.04	.131	1.2	3.20	.507	.053	None
5	1.014	4.62	5.78	5.51	.168	1.3	3.44	.601	.074	None
6	1.010	4.67	5.78	5.28	.171	1.1	2.56	.443	.053	Present
7	1.019	3.41	4.27	5.71	.186	1.4	3.39	.73	.053	None
8	1.012	3.41	4.27	4.11	.186	1.3	2.05	.57	.069	None
9	1.016	4.00	5 00	5.13	.187	1.3	2.95	.697	.065	Present
10	1.015	4.00	5.00	4.96	.168	9.00	3.45	.443	.051	None
11	1.022	3.41	4.27	6.48	.188	1.2	4.36	.730	.067	None
12	1.019	3.41	4.27	5.98	.262	1 3	3.66	.76	.082	None

W. B. D. PENNIMAN, *Analyst.*

AMBROSIA.

BALTIMORE, Febuary 2, 1897.

I have examined the sample of Ambrosia sent here January 29th, marked as follows: "This is a sample of Ambrosia, gotten by C. N. Mitten from Wm. Hopkins, January 28th, 1897, sample No. 1, Laurel, Md." The pretty label reads: "Sander's Celebrated Ambrosia, a pure, wholesome and invigorating tonic."

The contents of the bottle were found to be lager beer, containing 4.24 per cent. of alcohol. No salicylic acid or other preservative could be detected.

W. B. D. PENNIMAN, *Analyst.*

SUMMARY OF THE WEEKLY REPORTS OF INSPECTIONS OF GUNPOWDER AND LAKE ROLAND WATER SHEDS.

BALTIMORE, December 14, 1897.

During the year the Gunpowder, with its twenty-five branches, their divisions and subdivisions, and the Lake Roland supply with its three branches, and their divisions, have been personally

inspected three times as a whole, and repeated inspections and reports made of those in which the possible sources of contaminations were greatest.

The following report gives the names and branches of which there is the most cause for complaint. The branches on which there is no pollution I have omitted.

	Cases Reported.	Notices Served.	Removals.	Suits Entered
Freelands	1	1	1	......
Bentley Springs	....	....	....	......
Parkton	2	2	1	.....
White Hall	1	1	....	1
Monkton	1	1	1	......
Corbetts	2	2	1	......
Glencoe	1	1	....	1
Sparks	1	1	....	1
Ashland	4	4	....	4
Cockeysville	12	12	12	......
Texas	9	9	....	3
Lutherville	6	6	4	......
Hoffmanville	1	1	1	......
Towson	6	6	4	......
Butler	2	2	1	......
York Bridge	2	2	1	......
Warren	12	12	4	......
	Branches.			Suits Entered All Indicted.
Red Ore Bank	4	4	2	2
Third on East of Loch Raven	1	1	1	......
Fourth on west of Loch Raven	3	3	2	......
Fifth on West of Loch Raven	2	2	2	......
Sixth on west of Loch Raven	2	2	....	......
First above Meredith Ford	3	3	....	3
Fourth on east of Loch Raven	1	1	1	......
Overshoot	2	2	1	......
East Falls	3	3	....	......
George's Run	2	2	1	......
Western Run	2	2	2	......
Worthington's Valley	3	3	3	......
Beaver Dam	1	1	1	......
Providence	1	1	1	......

Making a total of ninety-five nuisances reported, ninety-five notices served, forty-four nuisances remedied, and fifteen suits entered.

GEO. H. EVERHART, M. D.

SUMMARY OF INSPECTOR'S WORK.

Inspections of stock for slaughter: Steers, 59,250; sheep, 160,211; calves, 5,299; total, 224,760.

Slaughterhouses inspected	88
Creameries inspected	10
Dairies inspected	87
Dairy cows inspected	839
Hog-pens, privies and sewers inspected	609
Water supplies surveyed and samples collected	383

Samples collected for chemist:

Milk	74
Beers	52
Vinegar	70
Nuisances abated	120

CHARLES N. MITTEN, *Inspector.*

ASPHYXIATION BY ILLUMINATING GAS.

BY DR. JOHN MORRIS.

The frequency of deaths from the inhalation of illuminating gas in the cities of this country, both by suicide and accident, makes the subject worthy of the attention of physicians, as well as humanitarians, and particularly sanitary authorities.

Several cases of asphyxiation, due to that cause, have led me to the investigation of the subject of gas manufacture, and the result of the process employed at the present time in the city of Baltimore. This was done with a view of ascertaining how far and how differently the lives of our people are endangered by the gas furnished them, and what precautions can be taken to prevent mischief in the future.

The Vital Statistics of the city, which only date back to 1830, show no cases of death from illuminating gas up to the time of the introduction of what is termed water gas.

There were three gas companies in operation in Baltimore at that time. The deaths that came under my observation, before alluded to, were produced by the inhalation of gas manufactured by the Mutual Consumer's Company. The gas supplied by the old company at this time was made almost exclusively from bituminous coal. For this purpose the coal was distilled in a close retort, and certain gases and vapors recovered, some of which were combustible, and some like steam, condensible, a residue of coke being left behind. Before delivering the gas to the con-

sumer it was necessary to remove those vapors which could be condensed, such as tar, water, etc.; and also those condensible gases which either diminish largely the illuminating power, if left in the gas, such as carbonic acid, or which, when the gas is burned, give rise to products of combustion which are injurious, such as sulphuretted hydrogen and ammonia. The removal of these necessitated two other operations—condensation and purification. The distillation of coal in the process of making gas was performed in iron or clay retorts, which were heated by a coke fire to a high temperature. This distillation continued for four or five hours. The retorts were then opened, and the hot coke raked away. The gas passed from the retort through the hydraulic main to the condenser, thence to the washers, where most of the ammonia was removed, and finally to the purifiers, where it was deprived of those noxious substances not taken away by the condenser. These substances are chiefly carbonic acid and sulphuretted hydrogen. Carbonic acid in gas lowers the illuminating powers, and sulphuretted hydrogen by giving rise in burning to sulphurous and sulphuric acid, becomes injurious to books, picture frames, and other delicate structures. It is impossible to remove the sulphur entirely from gas, but the English law requires that it should be entirely free from sulphuretted hydrogen, and that the amount of sulphur in other form shall not exceed 20 grains per 100 cubic feet. To remove sulphuretted hydrogen, carbonic acid, etc., several methods are used, the materials employed being lime and oxide of iron. Lime is used both in the wet and dry state, but, as it creates a nuisance in the neighborhood of the works on account of the noxious odors evolved, the iron process is preferred. This consists in passing the gas through some mixture containing sesqui-hydrate of iron. Sulphuretted hydrogen in the gas acts on the sesqui-hydrate of iron to form water, sulphur and hydrated sulphide of iron, which last, on exposure to the air, is changed again to sesqui-hydrate of iron, and more sulphur is set free. This is a cheap plan, and is very generally adopted in Europe. Gas thus made consists, according to experts, chiefly of hydrogen (40-50 per cent.), marsh gas (35-45 per cent.), carbonic oxide ($4\frac{1}{2}$—$7\frac{1}{2}$ per cent.), olefiant gas and other hydro carbons (4-8 per cent.), and usually very small amounts of carbonic acid and air. The composition of cannel gas is about the same, the proportion of hydrogen, marsh gas and olefiant being a little different. Gas is also made from petroleum, or naphtha, and is used extensively for enriching purposes. When made from Pennsylvania petroleum it contains no sulphur or ammonia, and requires no purification. According to Prof. Wood, Harvard University, to whom I am indebted for many statements in this paper, pure petroleum, or naphtha gas, can be inhaled with as much impunity as nitrous oxide, the symptoms produced being

quite similar. By naphtha gas is meant such gas as is made by decomposing naphtha in heated retorts, and not such as is made in gasoline machines. This is the kind of gas supplied to the city of Boston. It contains about 10 per cent. of carbonic dioxide, which can be inhaled without danger to life.

The third variety, the so-called water gas, is next to be considered. We shall go more in detail in describing the mode of preparing this gas for the reason that two cases of death from its effects have come under my observation. The theory of the manufacture of this gas differs entirely from that of coal or naphtha gas. It depends first upon the production of a non-illuminating gas from steam; and, secondly, upon the manufacture of petroleum, naphtha or cannel gas, for the purpose of furnishing luminence. The great advantage of this process is that very large volumes of non-luminous combustible gas can be made very cheaply. This is done by passing steam over incandescent carbon, which has a very powerful attraction for oxygen, abstracts it from the steam and unites with it to form at first a mixture of hydrogen and carbonic acid. The carbonic acid is on passing through another layer of coal, deprived of one-half of its oxygen, and thus becomes carbonic oxide (dioxide). We have then, as a result, if the process has been properly conducted, a mixture of hydrogen and carbonic oxide, both of which gases are combustible, but burn with a colorless flame.

Anthracite and not bituminous coal is used in making water gas, and great care is necessary to keep the temperature up to a white heat, since, if it falls too low, a large proportion of carbonic acid is formed which must be removed by purification, for, if not removed, it will injure the illuminating power of the gas. Anthracite coal contains sulphur, and yields ammonia when distilled, so that purification is as necessary in the case of water gas as of coal gas. Water gas made by the process thus described contains about 40 to 50 per cent. of hydrogen, 30 to 40 per cent. of carbonic oxide, about 10 of petroleum or naphtha gas. Formerly, the illuminating power of water gas was obtained by introducing into the non-bituminous flame, metallic platina, or by mixing the water gas with rich gas obtained from peat or resin, or some other carboniferous material. It will be seen that in the ordinary process for making water gas, from 30 to 40 per cent. of carbonic oxide is obtained. The Mutual Consumer's Company, no longer in operation, which made its gas by what was called the "Home" process, claims to remove this carbonic oxide, since in that process an excess of steam passes with the gas from the furnace or generator through a chamber filled with white hot fire brick, called a super-heater or fixer. This in the two fatal cases I mentioned was the gas inhaled. That carbonic oxide can be removed, experimentally, by heating to a high

temperature in contact with an excess of steam I do not deny, but that it is constantly accomplished, I very much doubt. That it was accomplished in the above cases, I do not believe.

Mr. Wurtz, the engineer of the company, stated at the time that there was no carbonic in the gas furnished by his compnny, and that it was in every respect a safer gas than what he termed marsh gas, that is the old gas from bituminous coal.

Mr. Wurtz depended entirely upon the effect of the gas upon lime water. He said: "The extraordinary fact must be stated that in no case was it found possible to detect the faintest trace of carbonic acid sulphur or ammonia. I have no hesitation in pronouncing this to be the cleanest gas that has come within my observation," and yet, notwithstanding this statement, the three gentlemen, Engle, Sheib and Wiener, died from the inhalation of this particularly *clean* gas.

Symptoms and Treatment.

The important fact deduced from the cases before mentioned (Engle, Sheib and Wiener), is the absolute impossibility of diagnosing the cause of death in the absence of any history of the cases. Had either one been poisoned by design—that is, had he been gagged and imprisoned in a room and compelled by force to breathe carbonic acid gas combined with carbonic oxide for seven or eight hours and then removed to a field or highway distant from the plaee of poisoning, and afterwards found in a state of coma, no medical man on earth would be able to point out the exact character of the trouble or the form of the narcosis from which he was suffering. The only resemblance to be found to opium-poisoning or the poison of alcohol would be in the character of the pupil and the condition of coma.

John Engle took lodgings at the Northern Central Hotel. In the morning the smell of gas was perceived through the hall, but the source of escape could not be discovered. About 9 o'clock, nine hours after Engle had retired to bed, the proprietors of the hotel broke open the door of his room, having first failed to get any answer by calling and knocking in the loudest manner possible. Engle was found in bed in a state of profound unconsciousness. His condition was very much like that of a patient profoundly under the influence of ether; but in poisoning by ether it is not likely, even if possible, for a person to live forty hours totally unconscious; indeed, I know no form of narcosis, save that produced by carbonic oxide, which could present the train of symptoms met with in this case. Placing the patient on a rocking chair before an open window, and covering him with blankets to keep up bodily heat, he was kept in that position for seven hours, so that he might inhale atmospheric air in the largest

measure possible. A powerful faradic current was in the meantime used along the course of the pneumo-gastric nerve to excite the muscles of respiration. Under its influence twenty-eight regular and deep inspirations were obtained. On the second day, however, the respirations became hurried (sixty in a minute), and wholly abnormal. I think it is possible that the patient may have had a convulsion sometime during the night, at an early stage of the narcosis, as his tongue was bitten. Though exposed to a draught of cold air for more than eight hours, the bodily heat never lessened. The temperature when first taken was 100½ in the axilla, and rose to 102½ before death. The respiration before the battery was used was 44, and somewhat shallow, but under the influence of the battery, as before stated, became deep and regular. The pupils were contracted to a pen's point, and the eye was totally insensible even to touch. Whilst the faradic current was being used the pupils dilated slightly, and the muscles of the face contracted very sensibly. These symptoms for a time gave those in attendance some encouragement. Hypodermic injections of brandy and ammonia were employed with very slight temporary improvement in the pulse. The circulation at no time gave evidence of the grave character of the trouble. When the patient was first seen it was about 120; under the influence of the battery it reached 140 pulsations to the minute, but became steadier and firmer. Towards the conclusion the pulse lost character and reached 160. The lungs were very little influenced by the effects of the poison. Some emphysema was present, but a notable absence of rales. The breathing at no time became stertorous. The only change that took place in the patient's condition that simulated consciousness was a moaning at intervals, as if from internal distress. This occurred a few hours before death. The condition of the skin was a marked feature in the case. There was a very sensible perspiration from the outset. This was increased afterwards to a very copious diaphoresis, which continued nearly to the last. The sweating was so profuse as to saturate the sheets and blankets. The kidneys, I believe, ceased to act after the first day. I emptied the bladder with the catheter on the first day, and obtained about 16 ounces of highly-colored urine, which contained, as may be well supposed, an amount of albumen. Afterwards I was unable to get a single drop. The urine, which appeared to be clear at first, became degenerated in two hours, resembling soapsuds in character. The excessive diaphoresis may have accounted for the scantiness of the urinary secretion, but its total suppression was no doubt owing to the uræmia incident to the blood poisoning. The patient died, however, without any sign of convulsions. Rigor mortis followed very rapidly, and was of a most marked character. No post-mortem was permitted, but had the body

been examined, the usual conditions found in such cases, such as congestion of the brain and an engorgement of the muscles of the heart, would have been discovered. The blood in this case became very dark, as was evidenced by the ecchymoses following the hypodermic injections. The blood is usually bright red in cases of poisoning by pure carbonic acid gas, but when it is mixed with carbonic oxide gas, as in cases of death from charcoal vapor, the blood is always found to be of a darker color than natural. It was formerly believed that deaths resulting from charcoal vapor were due to carbonic acid gas, but it is now known that it is carbonic oxide which is the deadly agent, it being evolved in the consumption of charcoal. Leblanc says, that one volume of it diffused through a hundred volumes of air. totally unfits it to sustain life; and it appears that the lamentable accidents which too frequently occur from burning charcoal or coke in braziers, or chafing dishes in close rooms, result from the poisonous effects of the small quantity of carbonic oxide which is produced and escapes combustion, since the amount of carbonic acid thus disffused through the air is not sufficient in many cases to account for the fatal result.

The symptoms in Mr. Sheib's case were very similar to those already described. The bodily temperature was never reduced though the patient lived for 36 hours; the skin was moist, but the diaphoresis moderate; the kidneys acted freely, at least a quantity of highly colored urine was twice obtained by the use of the catheter; the breathing was more hurried than in Engle's case, varying from 40 to 60 in the minute. The pulse was also frequent. The blood was dark, and when examined by the microscope, was found to contain but few corpuscles. Mr. Sheib never, at any time, gave evidence of consciousness, though the battery and other means were employed to rouse him from the deep coma in which he was found. I call this carbonic oxide poisoning, because I believe that carbonic oxide though present perhaps in a limited quantity, was the true source of the fatal mischief. As the blood was dark, it may be presumed that carbonic acid gas was the predominating influence. This may be true, for it requires a very small quantity of carbonic oxide to render carbonic acid gas a deadly poison. It is the admixture of carbonic oxide with carbonic acid gas that makes it so destructive; even five per cent. of the latter is fatal to life when so little as one-half per cent. of the former is mixed with it. The use of carbonic oxide gas as an anæsthetic was suggested many years ago by Dr. Ozanann, and from my observations of its effects in Engle's case, I am inclined to believe that if properly and duly blended with other agents, it may and will become a safe and useful means of producing anæsthesia. Taylor, in speaking of the gaseous products of lime burning, which are car-

bonic acid mixed with carbonic oxide and sulphurous acid, says: Persons who have incautiously slept in the neighborhood of a burning lime kiln during a winter's night, have been destroyed by the respiration of these vapors. The discovery of a dead body in such a situation would commonly suffice to indicate the real cause of death; but a practitioner ought not to be the less prepared to show that there existed no other apparent cause of death. It is obvious that a person might be murdered and the body placed near a kiln by the murderer, in order to avert suspicion. If there are no marks of external violence, the stomach should be carefully examined for poison. In the absence of all external injuries, medical evidence will avail but little; for a person might be even criminally suffocated, and his body, if found under the circumstances above stated, would present scarcely any appearance upon which a medical opinion could be securely based. An incident is related by Fodere to have occurred at Marseilles, in which seven members of a family were destroyed, in consequence of their having slept on the ground floor of a house, in the courtyard of which a quantity of limestone was being burnt into lime. In one case a man died three days after being exposed to the vapors of the lime kiln.

The treatment of poisoning by illuminating gas need not greatly occupy our attention. All the means used to save the lives of Engle and Sheib proved fruitless. Inhalations of pure oxygen have been suggested, but I do not see that they possess any merit over pure atmospheric air. Transfusion of blood, that is the transfusion of pure blood into one arm, whilst a vein is opened in the other arm to let out the vitiated blood, has also been suggested, but I much doubt the efficacy of such a plan. The truth is that owing to the degeneration, if not destruction, of the constituents of the blood, which follows the inhalation of illuminating gas, all the processes of life are arrested, and consequently we can but look on and watch the approach of death. Traube, in the Berliner Clinic, relates a number of interesting cases of gas-poisoning, the majority of which proved fatal. Berlin has increased very rapidly in population, and owing to the large influx from the rural districts, these accidents occur very frequently. Traube says that those who do recover lead afterwards a wretched life, and meet a lingering death from some lesion of the lungs, heart or brain. Traube's cases are a valuable contribution to the literature on this subject, and I commend his work to the attention of the profession. There are two processes employed by the Consumers' Gas Campany of this city in the manufacture of gas, that is, the Lowe's and the Wilkinson's. The illuminating power of this gas is very great and far superior to that obtained from bituminous coal. It burns with a bright, fixed, steady flame, and consequently is less injurious to the eyes than the gas manufactured by the old plan.

It is almost impossible to suggest a plan for the prevention of accidents from the inhalation of illuminating gas. The only suggestion that could be made would be for the gas company to have prepared several hundred thousands of neat placards of warning to be placed under every gas bracket in all the hotels, boarding-houses and private dwellings, if deemed necessary. I had a placard of this kind placed some years ago in many of the hotels. The sole and absolute remedy is the enactment of laws providing for the manufacture of illuminating gas by the use of coal, under which process there never was a death recorded in Boston or in Baltimore.

RABIES.*

JOHN MORRIS, M. D.

In reply to interrogations made by one of the leading New York journals in regard to the perils of inoculation for the prevention of Rabies, I replied that in my judgment the perils were very great—these perils being blood poisoning and tranmatic tetanus. My suggestion was that the prevention of Rabies was the only certain and absolute means to be employed to prevent future danger.

To illustrate the meaning of this advice, I will offer two examples:

Herman Keyser, aged thirty-six years, living at the corner of Lombard and Concord streets, was bitten slightly on the arm by a favorite dog in June, 1849. The dog was not known to be rabid at the time, as he gave no signs of madness, save a little fretfulness and irritation. Mr. Keyser called at my office, in Gay street, the next day, and my associate, Dr. Hintze, who believed in the old mercurial plan of treatment, placed him under a mild course of mercury, and canterized the wound very slightly with nitrate of silver. Under this treatment the wound healed very promptly, and Mr. Keyser believed himself per fectly well. He had no suspicions, no fears, no forebodings concerning the future. The dog died by strangulation in his own chain, without giving any evidence of positive madness. Mr.

*The State Board of Health is not responsible for the views expressed in the preceding two papers. Dr. Fulton asserts, in respect to rabies, that most of Dr. Morris' views are erroneous, and some of them dangerous. The following propositions are true beyond controversy: 1st, Rabies is a specific disease; 2d, There is a specific remedy; 3d, Pasteur virus, prepared and administered by competent persons, cannot convey tetanus, blood-poisoning, or any infection other than attenuated rabies.

Keyser enjoyed his usual health for about six weeks, when he sent for me to prescribe for him. He said that he had taken cold; that the day before, whilst very warm, he had stopped at a pump in the street and had drunk a large draught of cold water, which had checked the perspiration suddenly, and he had not felt well since; that he had had a slight chill, and felt a dryness and constriction about the throat. At this time he had no apprehension or thought, or fear of hydrophobia, and whilst I had my own misgivings, I did not, of course, communicate them to him. I prescribed for him a mild gargle and an emetic (why I prescribed the emetic, I cannot possibly imagine at this day, but I suppose it was the form of reasoning that prevailed at that time.) Authors say that pain is generally felt first in the wound, but Mr. Keyser never made the slightest allusion to the wound. I saw him on the morning of the next day, and there was very little change in his condition. He had not slept well, and appeared somewhat restless and agitated. In the evening the nervous disturbance was greatly increased, and difficulty of swallowing manifested itself; a sleepless night followed; nervous paroxysims came on; sensation of stricture about the throat increased; his breathing became short and hurried, interrupted by frequent sighs; a sensation of weight and oppression about the chest became a marked symptom; shuddering of the whole frame and an expression of anxiety and fear, amounting to terror, such as I had never seen before, was then developed. Hyperæthesia, an extreme sensibility to external things, was next evinced; even a breath of air seemed to excite a nervous paroxysm amounting almost to a convulsion. The patient could drink with very great difficulty, and only by a spasmodic effort, and I may remark here that it is a vulgar error to suppose that persons suffering from hydrophobia are unable to swallow liquids. The patient was constantly endeavoring to spit up a viscid-mucus, which was apparently secreted by the fauces, and this, I think, is one of the characteristic symptoms of the disease. This spitting is almost uninterrupted, and affected with the greatest vehemence. Mr. Keyser's mind was perfectly clear and calm, and it was only the day before his death that the idea of hydrophobia entered his thoughts, and he began to talk about having been bitten by his dog. There was very little constitutional disturbance throughout the period of his sickness, and he died on the fourth day from sheer, utter exhaustion. Now, in this brief and condensed statement, I think you have almost a typical case of hydrophobia. It has been drawn from memory, and may be wanting in some minor details. As to the anatomical lesions present in cases of death from hpdrophobia, I have no personal knowledge.

Treatment of Hydrophobia.

As to the treatment of hydrophobia, I have very little to suggest. We have no specific remedy to antagonize the poison. That such a remedy exists in nature, and will yet be discovered. I have no doubt. In Keyser's case I used large doses of morphia, as much as two grains every two hours, without producing narcotism, but with great amelioration of the distressing symptoms. I also employed chloroform, which was a new remedy at that time, but without perceiving any benefit from its use. The morphia certainly lessened his suffering, and made his death comparatively easy. What effect large doses of chloral would have in the same direction, I have no means of knowing. Had I another case to treat I would be disposed to use hypodermic injections freely, and also frequent injections of broth and quinine to sustain the flagging powers of life. Patients in hydrophobia die from exhaustion, and I have no doubt that if the vital functions could be sustained sufficiently long, the poison could be eliminated from the system as other poisons are, and recovery ensue. Therefore, I think all treatment should tend to this end. This, with our present limited knowledge of the nature of the disease, is, I conceive, the only rational mode of procedure.

Absolute Prevention of Rabies.

I have discovered, through the wisdom of another, a preventive measure, which is positively certain in its results, and has a scientific basis. I will relate a case to prove the correctness of this statement. Mr. F. W., living on Columbia avenue, was bitten on the wrist a few years ago by his pet dog. The wound bled freely. He immediately washed the wounded part with soap and water, placed a piece of iron wire in the gas flame and heated it to a red heat and applied it to the injured part. This heated wire is called in surgery the actual cautery. Its application does not cause the slightest pain, and effectually destroys the whole three layers of the skin, thus preventing any possibility of absorption. The usual plan of applying lunar caustic, practiced by apothecaries and ignorant physicians, is a delusion and a snare, for the reason that the caustic acts very slowly, and then only destroys the epidermis, or outer skin. Should a person be bitten in the fields or on the highway by a dog supposed to be rabid, and water and the red-hot iron not being readily procurable, human urine, which is always at hand, can be used as a detergent, and a burning match can be applied to the wound in place of the actual cautery. Urine in these cases is even a better wash than soap and water. The burning match will cause temporary pain if thoroughly applied, but it will effectually destroy the three layers of skin.

It may properly be said, in conclusion, that dogs having absolute liberty are not liable to contract rabies, as may be shown by the history of canines in the Orient. This disease is entirely confined to domestic life, and is unquestionably the outcome of what is flippantly termed "civilization," as it does not obtain in the extreme North or Central Europe, nor in any land where the dog labors and renders service to man.

Hydrophobia a Misnomer.

Hydrophobia, a term derived from two Greek words—water and fear—is a term used for rabies. There is actually no fear of water in attacks of rabies. There is a great difficulty in swallowing, a spasmodic condition of the muscles of the pharynx due to reflex irritation of the spinal cord, but there is no fear of fluids, inasmuch as patients swallow, it is true, with difficulty, milk and other liquids.

Caution.

Whenever the pet or favorite dog bites his master or mistress, he may at once be suspected of insanity. If a dog shuns the family and wanders from his home listlessly and aimlessly, he is probably in the incipient stages of the disease, and should be watched with the greatest care. He should be kept in seclusion, fed on hot milk, and all his symptoms noted. If he is suffering from rabies he will die in a day or two from convulsions; if from other causes, perhaps toothache, he will recover.

Hysteria.

Hysteria may in some degree simulate it, but can never be mistaken for Rabies by an acute observer. The poison, as is well known, is contained in the mucus or saliva of the rabid animal. Many animals besides dogs are capable of imparting it—the wolf, the jackall, the fox, the hyena, the horse, the ass and the cat, and perhaps others.

As to the belief in cases of spontaneous Rabies, much caution should be exercised. For my own part I believe that they are entitled to no credence. The poison of Rabies is a specific virus generated under peculiar conditions and subject to fixed laws, and its characteristics are unmistakable.

The question of the communicability of Rabies by human saliva has also been debated, and so far no positive opinion has been clearly attained. My own judgment is that the secretory ducts necessary to generate this poison are only to be found in animals and not in the human economy, the experiments of Majendie and Bichat to the contrary, notwithstanding.

APPENDIX.

PROCEEDINGS

OF THE

PUBLIC HEALTH CONFERENCE,

Held at the Hall of the Medical and Chirurgical Faculty of Maryland,

847 N. EUTAW STREET, BALTIMORE,

WEDNESDAY AND THURSDAY,

February 17th and 18th, 1897.

LIST OF MEMBERS.

Dr. Delano Ames, Baltimore.
Dr. G. T. Atkinson, Crisfield.
Mr. Geo. R. Ash, Elkton.
Dr. J. M. H. Bateman, Easton.
Dr. John R. Benton, Kent Island.
Dr. E. T. Bishop, Smithsburg.
Dr. J. H. Billingslea, Westminster
Dr. John D. Blake, Baltimore.
Dr. Jas. Bordley, Centreville.
Dr. Chas. H. Brace, Cumberland.
Mr. Henry Brauns, Baltimore
Dr. Philip Briscoe, Island Creek.
Dr Roger Brooke, Oakdale.
Dr. John O. Bullock, Lonaconing.
Dr. T. M. Chaney, Dunkirk.
Hon. H. M. Clabaugh, Taneytown.
Dr. T. A. Councell, Easton.
Mr. W. H. Dashiell, Princess Anne.
Dr. Robert Dodson, St. Michaels.
Dr. W. F. Elgin, Bethesda.
Dr. Chas. M. Ellis, Elkton.
Mr. John G. England, Rockville.
Dr. E. G. Etchison, Gaithersburg.
Dr Chas. Farquhar, Olney.
Dr. F. Fochtman, Cumberland.
Dr. Simon Flexner, Baltimore.
Dr. John S. Fulton, Baltimore.
Dr. Wm. Gischell, S. Baltimore.
Dr. French Green, Brookville.
Mr. E. O. Grimes, Westminster.
Dr. R. F. Hardesty, Arlington.
Mr. Chas. Hartshorne, Brighton.
Dr. W. F. Hines, Chestertown.
Dr. C. A. Hollingsworth, Belair.
Dr. J. A. Holton, Centreville.
Dr. D. W. Hopkins, Havre de Grace
Dr. J. R. Huntt, Laurel.
Dr. J. H. Jamar, Elkton.
Dr. J. H. Jarrett, Towson.
Dr. L. B. Johnson, Morganza.
Dr. Daniel W. Jones, Widgeon.
Dr. Geo. P. Jones, E. New Market.
Dr. J. H. Kennedy, Aberdeen.
Dr. John T. King, Baltimore.
Dr. Mahlon Kirk, Oakdale.
Dr. S. Chase de Krafft, Cambridge.
Dr. Wm. L. Lewis, Kensington.
Dr. Wm. E. Magruder, Olney.
Dr. C. L. Mattfeldt, Catonsville.
Dr. J. B. Merritt, Easton.
Dr. John Morris, Baltimore.
Dr. Oliver McLean, Frostburg.
Dr. J. H. McCormick, Gaithersburg.
Dr. Jas. F. McShane, Baltimore.
Dr. Wm. Nihiser, Keedysville.
Dr. Wm Osler, Baltimore.
Dr. Thos. S. Owens, La Plata.
Dr. Thos. B. Owings, Ellicott City.
Dr. J. B. R. Purnell, Snow Hill.
Prof. W.B. D. Penniman, Baltimore.
Dr. H. M. Revell, Annapolis.
Dr. Geo. H. Rohe, Sykesville.
Mr. Chas. B. Rogers, Towson.
Dr. P. F. Sappington, Govanstown.
Mr. Milton Schaeffer, Westminster.
Dr. E. M. Schaeffer, Baltimore.
Dr. Morris Shank, Clearspring.
Dr. L. M. Shipley, Ellicott City.
Mr. James E. Shreeve, Ellicott City.
Dr. J. McPherson Scott, Hagerstown.
Mr. L. P. Slingluff, Westminster.
Dr. August Stabler, Brighton.
Dr. George C. Steuart, Oxen Hill.
Dr. W. Royal Stokes, Baltimore.
Dr. A. E. Sudler, Sudlersville.
Dr. F. H. Thompson, Annapolis.
Dr. Jas. W. Urie, Still Pond.
Mr. Sheppard Webster, Cambridge.
Dr. Wm. H. Welch, Baltimore.
Dr. H. S. Weusthoff, Havre de Grace.
Hon. C. T. Westcott, Chestertown.
Dr. J. M. Worthington, Annapolis.

Minutes of the Day Session.

Wednesday, February 17th, 1897.

The Conference opened at 11.20 A. M., with sixty-six members present, representing twenty counties.

Dr. Edward M. Schaeffer called the meeting to order and said: It has long been recognized by statesmen, that the consideration of health is worthy of the first thoughts of the people, and we are glad to be inaugurating here a meeting that has for its object the promotion of health, and which begins under such favorable auspices, with delegates present from nearly every county in the State. We are only too glad to welcome so many from the remote parts of the State, and the more remote, the more glad we are to see them. We have the co-operation of the Johns Hopkins University, the State Board of Health, the Health Department of Baltimore City, both School Boards, the "old" and the "new," the School Teachers' Association, and, we hope later to receive delegates from the Arundell Club.

The question of Vital Statistics will come up for discussion, and I will say just here, that every one regards such statistics as the basis of sanitary reforms. They are to us as useful as book-keeping to the merchant; in fact, Vital Statistics are sanitary book-keeping.

Gentlemen, we shall have as our presiding officer today, the Chief Executive of the State of Maryland, and I take great pleasure in introducing to you Governor Lowndes.

Hon. Lloyd Lowdnes: Gentlemen, I am very glad to have the opportunity of being here this morning, and I regret that my engagements are such that I cannot continue with you during the day and tomorrow.

I thank you for the honor of presiding over this Conference, composed as it is of so many of the leading men of the State, who have come together for the purpose of considering how health can best be maintained or restored, and how the towns and cities of this State can be kept pure and healthy. I congratulate Dr. Schaeffer, and the Secretary of the State Board of Health, Dr. Fulton, on having aroused so much interest throughout the State in these matters. I hope the movement begun here today will continue and grow into a permanent organization, with a large and active membership throughout the State. I am

here to preside, not to make a speech, and you are here to work, so that during the short time I can spend with you, I shall try to see that your work is done in a prompt and orderly manner.

The gentleman who will make the address of welcome is one who stands high as a physician, as a man of letters, as a writer; a physician, a teacher, and an author; connected with one of our best institutions, an institution that we are very proud of and which we should do all we can to foster. He came to us from a foreign shore, but he loves Maryland and the United States as his native land. I have the pleasure of introducing to you Dr. William Osler.

Dr. William Osler: Mr. Chairman and gentlemen—It is no new thing for the ancient and honorable Faculty of Maryland to take an interest in health matters. If you look through its records for a hundred years you will find that it has always been the trusted adviser of the people of this State in all times of peril. Into the history of the part that has been played by the Faculty in health matters in this State, time will not permit us to enter, but I may call attention to the fact that this is not the first Conference that has been held under its auspices. From this society we speak in an authoritative manner to the people of Maryland, and in this hall, questions affecting the health in all parts of the State may be discussed, and an organization should be fostered which will be recognized in all the different counties as the highest authority upon Vital Statistics and health.

It seems to me there are three or four things in which we should attempt to guide the public. The first is the reorganization of the State Board of Health; an organization on a basis that shall have the county as an essential element, so that in each county there shall be a paid official of the State Board of Health, an officer, not of the county only, but of the State, and who should be paid by the State to take charge in his district of everything relating to Vital Statistics and to public health. An organization of that kind is really the ideal plan towards which we should work, but we cannot get it without first educating the public. It is useless to go to the Legislature unless we shall have first gone to the people, and the people throughout the State must see that their representatives fully realize the importance of the whole subject and of its chief details.

The second relates to the lunacy laws. When I say that there are nearly five hundred insane people in the almshouses and jails of this State, I add that it is a reflection upon the intelligence of the people of Maryland. I make this unflattering assertion because it is recognized the world over, that insane people must be cared for by specialists, and must not be herded together in jails and almshouses. They are the children of the State and should not be left to the care of the ordinary physician, who

may be able to treat typhoid fever or pneumonia well enough, but has no sort of skill in the management of special diseases of the brain. I make no reflections upon the almshouses of this State, but I say that no physician who has not had special training is capable of treating lunacy properly. I might say also that thousands of dollars would be saved to the State if all the insane were treated by specialists.

The third point relates particularly to the health of Baltimore. Baltimore needs many things, but it needs first proper milk inspection. In this city of half a million people we have no control over the milk supply. It is essential to the health of this city that the State and City Health Boards should have sanitary control of every dairy that sends milk to Baltimore.

Another important thing is a hospital for infectious diseases. That is recognized as a necessity in every city, and it will come here in course of time.

A more important matter is the proper supervision and control of water supply, and that must be had at the earliest possible moment. These questions will be discussed here, and they will engage the attention of the faculty for the next few years.

Hon. Lloyd Lowndes: The gentleman who will respond to the address of welcome made by the President of the Medical and Chirurgical Faculty comes from the portion of Maryland that furnishes pure fish, oysters, terrapin, and other delicacies which do not require inspection, at least so they claim on the Eastern Shore. I have the pleasure of introducing the President of the State Board of Health, Dr. S. Chase de Krafft, of Cambridge.

Dr. S. Chase de Krafft: Mr. President, fellow-practitioners of medicine in Maryland, and gentlemen: It gives me pleasure on the part of the State Board of Health of Maryland to acknowledge our sincere thanks to the Committee of this Faculty, who through their indefatigable efforts have made it possible to have this meeting of persons interested in Public Health. This great gathering of prominent men from all parts of the State assures me that the work of your Committee has been a perfect success, and I feel confident that the Faculty can from this, the first moment, congratulate itself on the success of this important movement. This meeting further assures me that the medical profession of Maryland are not obtuse to the necessities of the hour, but that on the contrary they realize the importance of the work before them, which they cannot shirk if they wish to march on in the path of progress, and keep step with their brethren in other States. I assure you, gentlemen, that the members of the State Board of Health have the will and the energy to do their duty to the people of this State, but unfortunately, through imperfect legislation and want of sufficient funds, we find ourselves almost powerless in the presence of most serious problems.

The gentlemen who will succeed me will show conclusively to this Conference the reasons why the Vital Statistics of Maryland have not been reported; why we have had no records of births and deaths, except in Baltimore city; why no burial permits are issued; why reports of contagious diseases are not made; and in the course of the meeting other important subjects will be fully discussed by gentlemen better fitted for the task than your humble servant.

Gentlemen, this Conference opens up a great field for the useful activity of its members, and if it will fully inform the people of this State of their sanitary needs, and help the Board in the propagation of hygienic knowledge so that with the help of the whole medical profession, we can make a vigorous attack upon all preventable diseases, and can obtain from the legislature such plenipotentiary powers as will insure the success of our movements, it will have accomplished a great work.

When the Board states that many lives are lost each year for want of proper laws and sufficient funds, is it not time for the people to know it, in order that they may right this shameful state of affairs? I feel confident, Mr. President, that this Conference will accomplish all that we could expect of it, and I have no doubt that its effects will be far-reaching. Whilst I have expressed the sincere thanks of the State Board of Health to the President, and members of the Medical and Chirurgical Faculty of Maryland, for their united effort to make this Conference a success, I would be derelict in my duty to the State Board of Health, as well as to the members of my profession, were I to lose this opportunity of mentioning our worthy Secretary, Dr. John S. Fulton, who has with his untiring energy and perseverance helped to add to the success of this meeting.

In conclusion, Mr. President, let me express the hope on the part of the State Board of Health, that the results of the wise deliberations of this Conference will be memorable in the future as having produced the greatest benefits possible to the health and happiness of the people of this great State.

Hon. Lloyd Lowndes: I am sure we are very grateful for the very plausible and emphatic suggestions made here this morning. We now come to the business details of the meeting, and I need take no time to introduce a member who is so actively engaged in introducing himself to you all. He enjoys the full confidence of the Faculty and of the State Board of Health, and his experience, ability, and good judgment have been very profitably occupied in arranging this meeting. I introduce Dr. Fulton, Secretary of the State Board of Health.

VITAL STATISTICS.

By John S. Fulton, M. D.

The pursuit of scientific truth is by one means and one method. Observation is the only means, and repetition the only method. Without repeated observation is not anything known that is known. No single observation determines any truth. The first product of observation is suggestion, or conjecture; repetition transmutes the crude material first into opinion, then to conviction, and at last, perhaps, to demonstration. Early in the series one may doubt the observation; at the end of the series one doubts not the observation, but the observer.

The scientific method is, therefore, essentially statistical. Indeed, statistics of one sort or another are the only ground upon which any of the business of this world has ever been successfully conducted. Each of us manages his own affairs by light of his own and others' experience, that is, by the statistical method; or else he mismanages.

Those who say what we so often hear, that statistics are misleading, mistake the passive for the active, like the belated and elated citizen who at midnight damns the keyhole for an artful dodger. Delusion is wrought, not by figures that lie, but by liars that figure.

To make a contention for the application of the statistical method to the latest, largest, and most important section of the field of practical medicine, is to engage in a work which ought to be wholly unnecessary.

Statistics opened the door to preventive medicine. In most civilized countries vital statistics have long been collected, not for any medical use, but for their great business value; and their regular, systematic record and classification not only first demonstrated the need of organized effort, but have also been of constant service in the device of means to prevent disease and death.

In England, vital statistics have been collected and published since 1838, while the first report of the Medical Officer of the Privy Council appeared twenty years later. The vital statistics of Massachusetts have been collected since 1842, but the Board of Health was not created till 1869. The vital statistics of Michigan antedate the organization of the Board of Health by five years.

The commonwealth of Maryland instituted her public health organization upon indications furnished by the statistics of other communities, and yet lacks figures of her own which can justify the existence of a Board of Health. Apparently Maryland is content to be told once in ten years that her capital stock in human life has increased. She never conducts such an inquiry for herself, nor ever asks if human life has anywhere been wasted. She

collects information about the frequency, extent, localities, causes of, and defences against fire, and a hundred or more fire insurance companies adjust their rates accordingly. The life companies do a vastly greater business, based upon statistics which do not contain a single line of Maryland figures.

There are reports upon oysters, terrapin, and game; the cattle on her hills are numbered; there are treasured archives in her herd books; and the Live Stock Sanitary Board meets thrice weekly. The State Board of Health has monthly meetings, but makes no record when a Maryland mother does her duty. A practice of State Medicine which wants those things which can best direct its measures and attest its results has little kinship with the science of today. It is more closely related to the art of a century ago, so brutally characterized by Sir Astley Cooper, whom one will not quote for fear of falling into condemnation.

If it is sought to move legislation to supply such data, it must, I fear, be shown that some good will accrue to the commonwealth, other than a practical knowledge of the forces arrayed against public health. The preaching in season and out of season of hygiene is utterly futile, so long as the commonwealth is under no conviction of sin. Citizens, councils, and corporations will only hear the voice of the tempest or the earthquake. Four cases of rabies send a shudder to every fireside, and set aroar all the presses of the State; but in ten lines weekly from the City Hall Department there are suppressed more and worse "'orrible and disgustin' details." If all days were dog days, rabies would not cut so wide a swath of desolation as marks the unobstructed path of measles or of whooping cough. In 1890, measles slew 248 innocents in Baltimore, and this city has, for twenty years, paid tribute of about two lives a week to whooping cough.

The ever active Health Department was recently besieged with inquiry. Nearly half a million people wanted to know why the water smelled bad. Did any one ask Dr. McShane whether water-borne diseases were costing us more than the usual two lives a day?

A town nourishing and cherishing 80,000 culture vats for intestinal bacteria sets up a hundred gates at railway crossings, as if by some subtle algebra, the value of life might be computed from the manner of death.

Does the medical profession of this State of Maryland appreciate the value of vital statistics? I fear not. If they did, no legislature could withstand their clamor for a law on the subject. Statistical tables are rather seldom studied by the rank and file of the craft. Ignorance of the use of this weapon must be somewhat prevalent everywhere, or we should not so often see bad theories obtain a temporary succcess by the aid of figures. We are learning today from the laboratories many things that might

long since have been demonstrated by mortality tables. The unity of croup and diphtheria was practically shown by vital statistics years ago. In an assembly acquainted with the statistics of rabies, any person who would maintain that there is no specific disease entitled to that name would enjoy the same unenviable distinction accorded to the Rev. John Jasper, who thinks that the "Sun do move."

If this convention shall accomplish no other work, it will have served the State well if it shall unite the profession to believe and to propagate the truth that the people of Maryland have absolute need of a yearly balance sheet of life and death.

What data must vital statistics provide? From the business point of view the commonwealth has equal need to know her birth rate and death rate. From the medical standpoint, a knowledge of the places, causes, and number of deaths is of first importance. Obviously the prime requisite for preventing deaths is a knowledge of the causes of death. The number of deaths assigned to each cause and each locality gives us the needful acquaintance with the strength and position of our enemies. To know these things is the first and constant need for the sanitarian. They may not be learned once for all, but must be relearned from week to week, and from year to year.

Various methods of collecting returns of death have been tried with less or more success, and it has been found that accurate results cannot be secured except by systematic registration of the facts at the time and place of their occurrence. Returns made weekly lose much of their value; monthly returns are worse, and yearly returns have little or no value. It is also clear that the facts must be recorded by an expert observer. The returns of undertakers and ministers are, and always must be, incomplete.

The only sure method of obtaining such records as may be profitably compiled and classified is based upon legislation which forbids the burial of a human body, except upon issue, from a central office, of a permit based upon a complete and accurate registration of the facts connected with the death. Such a record will embrace the name, age, race, sex, social condition, occupation, birth-place, residence, cause of death, duration of illness, with all other information which has practical interest and can properly be conveyed by the attending physician, or next of kin. The most available source of expert information is the attending physician.

Now the physician has no personal interest in the execution of such a law, and sometimes he objects to the imposition of such a tax upon his time without the offer of any compensation. I do not think that this objection is a very common, nor do I consider it a very reasonable, one. His is a protected industry, and the physician receives, even in this State, certain privileges and

immunities which fairly compensate him for the trouble involved in the preparation of a death record. The law can, of course, not compel a physician to testify to matters of which he has no personal knowledge, such as the age and birth-place of a decedent, but under her police power, to protect life and prevent fraud, the State may exact of a physician testimony as to the cause of death.

In certain exceptional instances the responsibility of the physician may be very great, since he is the first judge of the evidence as to whether or not the death was due to crime or negligence, or whether further inquiry is necessary. He may not be required to testify beyond what he knows, but it should be easy for him to indicate in his report what matters are of personal knowledge, and what are the results of inquiry.

It is in all cases wise, and perhaps generally necessary, to verify the death. Fraudulent reports of death are often the basis of swindling schemes. In France, Austria, and Belgium reported deaths are always subjected to verification by a physician employed and paid by the State. In England, and in our own country, the signed testimony of the attending physician secures the issue of a burial permit.

A very appreciable benefit to well qualified practitioners indirectly follows the practice of registration of deaths. The first thing which a registrar will have to inquire is, whose certificates shall be accepted? This question will not be settled in a week nor in a year. The character of the documents presented will more and more emphasize the necessity for discrimination as to who shall and who shall not be admitted competent to testify as to the fact or cause of death. If the State can of right demand any special qualification of medical men, it must exact that they shall be fit to certify as to the cause of deaths occurring under their observation. Thus the death certificate lays the foundation for effective legislation upon medical education, and draws a very clear line between the fit and the unfit to practice medicine.

To meet the physician's want of knowledge of past history of a decedent, the death certificate should be in two parts. The first part devoted to name, age, race, sex, social condition, occupation, residence, parents' names, and place of death should be filled and signed by the householder or next of kin. The second part should be the certificate of the attending physician, who should state that he attended the deceased from——to——, last saw him alive on——, and that he died on——date at——time, cause of death, duration of disease and complications.

The certificate thus prepared upon competent evidence, and presented at a central office, a burial permit should be issued to a legally authorized undertaker or sexton, who should be obliged to return to the central office the fact, place, date and manner of

burial. These regulations should have flexibility to meet certain exceptional contingencies, such as coroners' and other judicial inquiries, and deaths from contagious disease, where speedy burial is desirable.

Under such a system no penalty need be provided for failure on the part of the physician to report a death. The penalty would fall upon any person who should bury, or attempt to bury a human body without a permit. A penalty should be provided for fraudulent report, as for instance, the concealment of an infectious disease under a certificate of death from heart disease or paralysis.

This method would, if put into practice in our State, secure the registration of all the essential facts concerning ninety-five per cent. of the deaths which occur. The data so obtained, properly classified and compared, would be a useful implement in the hands of the State Board of Health.

The relation of the physician to the registration of births is not that of an expert witness. Such statistics are not of medical use and the medical man has no other interest in them than that of the average citizen. He should not be compelled to collect and return them unless he is paid for it, but having particular knowledge of the practical value of such statistics, he, more than any other citizen, should insist that they shall be exhaustively collected and exactly kept. They are of steadily increasing value both for private and public use, and their importance is most appreciated where they have been longest preserved. I suspect more pension claims are delayed and obstructed for lack of record of the marriage of parents and the births of children, than by any other cause whatever.

We have statutory provision as to the "age of consent," as to responsibility for crime or misdemeanor, as to voting, as to education, as to child labor, as to descent, as to guardians and administrators, as to disabilities of minors, as to jury duty and military service, as to marriage, admission to certain professions, as to public office, etc. To meet the difficulties growing out of the absence of records, the courts admit the best "obtainable evidence." Securing the best "obtainable evidence" costs almost as much money every year as would pay the expenses of a vital statistics bureau.

The vital statistics of Chicago are confessedly very incomplete, not more than sixty per cent. of births being reported. The Registrar of Vital Statistics of Cook county furnishes a thousand copies a year of certificates of birth, which are accepted as final and conclusive evidence. The same official can also furnish a multitude of instances in which application has been made for copies of non-existent records, in default of which claims failed of adjustment, or remain yet unsettled, or were at last adjudicated after great expenditure of time, money, and labor.

Most experts think it is impossible to collect statistics of sickness, believing that the compulsory notification of infectious diseases is as far as the law can carry us in that direction. To obtain the registration of infectious diseases, four plans are used: First, immediate notification of the health officer by the doctor; Second, notification by the householder, or next of kin; Third, doctor to notify householder, householder to notify authorities; Fourth, both doctor and householder to notify.

The British Parliament in 1889 passed an infectious disease notification bill which contained the following provisions: "The head of the family to which such inmate belongs; and in his default the nearest relative present in the building, or being in attendance on the patient; and in default of such relations, every person in charge of or in attendance on the patient; and in default of any such person, the occupier of the building shall as soon as he becomes aware that the patient is suffering from an infectious disease to which the act applies, send notice thereof to the medical officer of the health district. Every medical practitioner attending on or called on to visit the patient shall forthwith, on becoming aware that the patient is suffering from an infectious disease to which act applies, send to the medical officer of health for the district a certificate, stating the name of the patient, the situation of the building, the name of the head of the family or other person who appears to him primarily liable to formally give the notice under this act to the medical officer, and the infectious disease from which, in the opinion of such medical practitioner, the patient is suffiering. Every person who fails to give notice or certificate as required by this section, shall be liable on summary conviction in a manner provided by the summary jurisdiction acts, to a fine not exceeding forty shillings ($10). The local authority shall gratuitously supply forms of certificate to any medical practitioner residing or practising in their district who applies for the same, and shall pay to every medical practitioner for each certificate, duly sent to him, in accordance with this act, a fee of 2s. 6d. (62 cents) if the case occurs in his private practice, and of one shilling (25 cents) if the case occurs in his practice as medical officer of any public body or institution."

In Rome, physicians are supplied with a little book of coupons of which two are detached whenever a case of infectious disease is discovered. One is delivered to the "syndic" and the other to the health officer. It is thought that these two officers act as a check upon each other. The law is very effective in its operation.

Physicians in this country have a reasonable opposition to a law which inflicts a penalty upon them for failure to do that which if done, will invoke the hostility of their patrons, and

cannot be expected to actively controvert the narrow views of those who regard the notification of infectious disease as a violation of professional confidence.

The responsibility should go directly with the interests involved. The interest of physician and householder alike require that early diagnosis shall be made and expressed in such cases. It is one of the professional obligations of the physician that he shall notify the householder. He should, for the protection of the householder, be obliged, under penalty, to do so in writing. The householder should acknowledge the notification in writing and should, for the physician's protection, release him from responsibility for the result to the family of the presence of infection.

It is directly against his own interest for the physician to assume the responsibility of either isolation or disinfection, and it is a grave default of ordinary skill and care if he fails to advise both isolation and disinfection. He dare not testify that a case which he sees once or twice a day is isolated, and he cannot afford to disinfect even if he be perchance competent to do so. In all towns and villages where a health organization exists, it should be unlawful for the practising physician to disinfect a house. Such a prohibitory law would conserve the interests of both the profession and the public. It is enough that the doctor shall engage not to convey infection into or out of the sickroom, and his patrons should not be permitted to lightly regard these extraordinary responsibilities.

The interest of the householder in the notification of the authorities is direct and immediate, since he needs what the doctor probably cannot give him if he would and probably would not if he could. Having both a private and a public interest in the notification of the health authorities, the householder should bear the penalty of failure to notify.

The popular prejudice against compulsory notification survives because such ordinances are not enforced with respect to the minor infectious disorders. If househoulders were obliged to report mumps, whooping cough, and measles, their experience with the milder affections would teach them that the law is both benevolent in intention and beneficient in action, so that in graver emergencies the intervention of the law would be, not suffered, but invoked.

In Rome, the services of the public disinfectors are asked and obtained at short intervals during the progress of such a disease as tuberculosis.

The statutory provisions as to the time of reporting infectious disease should be stringently enforced. The report must follow the diagnosis immediately. In practice it is found that the report too often waits on the prognosis, and anticipates the burial permit by such a breathless interval that one suspects there has

not been a fair race between the shadow and the event. The weak point in most laws is the phrase "dangerous to public health," which is designed to include within the meaning of the act diseases not mentioned by name. In practice this descriptive phrase adds a third proposition essential to a conviction. It is possible to name all the diseases to which such an act should apply, and conviction should follow proof of two propositions: first, that a disease named in the act existed at the time and place; and second, that it was not reported.

If it be true that complete statistics of non-infectious diseases are impossible of collection by law, I do not believe that the sanitarian is therefore obliged to pursue his work without the aid of such statistics. The scope of a statistical inquiry into disease is not defined by the nature of law, but by the community of interest among scientific men, and the degree of success or failure to collect such data is the precise measure of the scientific spirit. Experience shows that abundant data can be gathered upon any subject in which a number of people have a common interest. The now almost forgotten project of Louis by which a science of therapeutics was to have been built upon the collective study of symptoms failed, because the means were not related to the end, and in its failure demonstrated that the persistent interest of many men could be held by a common motive.

The late Benjamin Ward Richardson inaugurated a plan for the collection of sickness statistics, but in a short time the expense of preserving the observations became too burdensome for the body of contributors. The accumulated records, of great value, were offered to the government, but were declined.

One general rule applies to all undertakings engaging the services of many men. The relations that are not mutually helpful are either hurtful or sterile. So that in order to collect statistics of sickness it is only necessary to convince a sufficient number of competent physicians that some adequate return will be made for contributions to such statistics. The best of our craft will not contend for fees in such work, but will be satisfied to know that the recorded and classified data will be of current use, or that the central office, which receives them, will return some sort of service.

The argument that a systematic record of all sickness would be too expensive is perhaps a good one. But perfectly reliable statistics of disease do not require reports of all sickness. If the returns of a competent corps of observers, say one hundred, well distributed over a given territory, reporting weekly, give results which are quite consistent from week to week, from month to month, and year after year, such statistics must be accepted under the law of probabilities as sound data. In Michigan, such a system of weekly reports has been practiced for twenty years

and the records are of a surpassing value. One hundred observers sending weekly reports of the sickness occurring under their observations would put an instrument of precision into the hands of a central officer who should know how to handle those reports.

It is not only theoretically, but practically, true that a hundred representative physicians in active practice will each see whatever disease is present in each locality and will certainly see, year in and year out, a fixed proportion of all the disease in the State.

That such reports can and do display in the aggregate the consistency and delicacy of instruments of precision is well illustrated by the chart which shows a wonderfully close relation between the average atmospheric temperature and the monthly reports of sickness from pneumonia in Michigan. The relations are so close that a formula may be derived from them which will enable one to compute within a very narrow margin of error the monthly pneumonia rate from the known average temperature.

It will thus be seen that in dealing with so large a subject as prevailing sickness it is no more necessary to have all the data of all observers, than one requires the readings of all the thermometers in Baltimore in order to determine the atmospheric temperature.

It is difficult for any man who is sensible of his own fallibility to realize that his observations with those of a number of equally fallible men will yield results of unvarying accuracy, but it is so. The combined records of a hundred sensible, honest men is a mine of many times the wisdom of any one wise man. It is out of the combination and not out of the addition or multiplication of observations that true results are accomplished and made evident. Truth is consistent and coherent, error inconsistent and incoherent. Hence as the mass of data grows the separation between truth and error grows even clearer.

Records which are erroneous may still be useful, since few observations are false *in toto*, and even should the concrete error of a false classification be made, its falsity will one day appear and will be found capable of correction without disintegrating, perhaps without even dividing, the mass. Does any one wish that the statistics of croup had never been preserved, because they should have been charged to diphtheria, or that the statistics of typho-malarial fever were better lost than kept in the wrong pigeon-hole?

I hope in the course of the meeting to show you illustrations of the easy recognition of false statistics, and of the characteristic features of true tables, and that errors so neutralize each other as to have but little appreciable effect upon the total results of all statistics.

In conclusion, then, we have to say:

1. That compulsory notification of births, deaths, and infectious diseases is a proper and important concern of the State, and the

worth of such records far outweighs the cost of obtaining them. Statistics of birth and death must be complete, because the State demands mathematical results.

2. That the collection of sickness statistics does not require and may be better effected without legislation. Their use being that of a sample for analysis, their value does not depend upon numerical completeness, but upon the fidelity of the observers. Such inquiry is a proper work of physicians; and of the best physicians.

To the first proposition I have offered no proof that is new to, or needed by, any of you. Upon that we are agreed. To the second I invite your most serious consideration. If from this convention an impulse shall go forth which shall at length give Maryland an effective vital statistics law, it is well; but if this assembly should realize its collective strength, and, believing that its combined observations are true beyond the criticism of the strongest, should bind fifty men in a resolution to report weekly the diseases under care, by such means we should obtain weekly diagnosis of the State, and so anticipate and provide against deadly contingencies. Fifty men cannot be selected and invited to such a service. If work of that sort is to endure, the impulse must arise in the individual, and the fittest men are they who look upon their own impulses with some distrust.

Says Emerson: "The differences between men in natural endowment are insignificant in comparison with their common wealth. Do you think the porter and the cook have no anecdotes, no experiences, no wonders for you? Everybody knows as much as the savant."

Let us besiege the shrine. The oracle will come and we shall discover how rich we are. To each man is the "swift chance," but never too swift for all of us; to each "experience is delusive," but all may see the serried facts; to each is "judgment difficult," but that which all affirm is so.

The next paper was by Dr. Chas. L. Mattfeldt of Catonsville.

Dr. Mattfeldt said: "Knowing I would be preceded by such an eloquent speaker as Dr. Fulton, and being very busy for some time past, I wrote a brief paper, and that only to jot down a few thoughts upon which to base my remarks. I consider nothing more important to the State than accurate statistics. In Baltimore county we are not compelled to keep a record of births, nor to issue death certificates.

Under such a system, how can our statistics give any accurate knowledge of the diseases existing in our community. I wish particularly to call attention to the dangers which exist for lack of suitable laws regulating the burial of bodies in the counties."

VITAL STATISTICS.

By Charles L. Mattfeldt, M. D.,
Catonsville, Md.

My consideration of this subject is due to the absence of any means of collecting accurate vital or mortuary statistics from the counties of Maryland so as to enable the superintendent of vital statistics to collect and compile them and to make them of practical use. I consider nothing more important to a State or community than this. In Baltimore county we are not compelled to keep a record of births nor issue a death certificate unless the deceased is to be buried in one of the cemeteries in the limits of Baltimore city, or unless death is due to contagious disease, in which case we are requested to send notice to the Secretary of the State Board of Health.

Under such a lax system how can the Superintendent of Statistics give any accurate information as to the prevalence of certain diseases in his community? Before going into details as to what I consider are the most important statistics and how, in my judgment, they can be collected, I wish to call your attention to the danger of not having suitable laws regulating the burial of bodies in the counties. I particularly wish to remark with what ease a body can be disposed of, and to emphasize my remarks and bring them more clearly before you, will relate two suspicious cases which occurred in my county and which doubtless would have been investigated had they taken place in the city.

Some years ago a carriage stopped before the residence of a midwife and a woman was removed from it and carried into the house. A physician from Baltimore city visited her and in about one week she died and was buried, the utmost secrecy being maintained, no one knowing from what she died. The second case was an infant which died without medical attention, the parents reporting pneumonia. The body was buried and nothing was thought of it as no burial permit was required. Some months later I was asked several pertinent questions by the mother of the child and from these drew deductions that the child had been smothered to death with a pillow. Several physicians of Baltimore city have alluded to this danger and were surprised that in the enlightened age in which we now live such a state of affairs should exist, especially in such close proximity to a large city.

Pardon me for this transgression and I now will proceed to consider what in my estimation are the most important statistics required for health purposes and how best to accomplish them.

1. The annual mortality, the causes of death and the mean ages at death.

These facts could be obtained by the adoption of a certificate of death similar to the one issued by the Health Department of Baltimore City (but of more convenient size, so as to enable one to carry it in his pocket, if necesssary), making it the duty of the physician who attended the deceased during his or her last sickness, or the coroner, when the case comes under his notice, to furnish within twenty-four hours after the death to the undertaker or other persons superintending the burial, a certificate setting forth, as far as can be ascertained, the full name, sex, age and condition (whether married or single) of the person deceased, and the cause and date of death, also duration of last sickness; and it shall be the duty of the undertaker, or other person in charge of the burial of such deceased person, to state in the certificate the date and place of burial, and having signed the same to forward it to the local health officer within twenty-four hours, and that no interment of the dead body of any human being or disposition thereof in any tomb, or vault, or cemetery, shall be made without a permit therefor, granted by said officers, and that said officers shall keep a record of such certificates and forward a copy of same every six months to the Registrar of Vital Statistics.

2. The births to population and the relative number of live and still-born children.

To accomplish this and also to make it more difficult to conceal cases of infanticide, it should be made compulsory on any physician or midwife, or other person in charge, who shall attend, assist, or advise at the birth of any child in said county, to report to the local health officer, stating distinctly the date of birth, sex, and color of the child or children born, its or their physical condition, whether still-born or not, the full name, nativity, and residence of the parents. The local health officer should also keep a record of these facts and forward a copy of them every six months to the Registrar of Statistics.

The importance of registration of births no one will deny. These records could be used as evidence in legal disputes involving questions of birth, as to time and circumstances, such as legitimacy or illegitimacy of children and right of suffrage because of age or nativity. In my own experience I have enabled several widows to receive pensions who would perhaps not have received them, or have been unnecessarily delayed by want of evidence as to death of husband and birth of minor children, my private record being taken as evidence in such cases, especially as to ages of minor children, and, in fact, no other existed, as in several of these cases the parties not beiug able to write did not even keep a record of such facts in their family Bible, which, I believe, is the family record book in the counties.

3. The annual rate of increase of population. This is no

doubt the most difficult of all to procure. The census of population in the counties being taken every ten years only, to arrive at the annual increase from this must of necessity be extremely difficult; to prove such returns annually would be well-nigh impossible, owing to the great amount of money required to accomplish it, as we have no police force sufficiently large to take a census as is done in Baltimore.

4. The amount of sickness to population. To secure data showing prevalence of various diseases is quite a difficult task, unless it should be made compulsory on physicians to report them to the proper officers.

In 1895, Dr. James A. Steuart, the then Registrar of Vital Statistics, attempted this by issuing prepared postal cards, accompanied by a circular letter, requesting physicians to fill out the cards and forward them to him, but with what success you can best learn by perusing the report of the State Board of Health for that year.

My plan of accomplishing this would be for the State to furnish every physician with a prepared record book in which to keep a record of his cases, which I think he would do for his own personal edification, as well as for the benefit of the State at large, and that he be required to forward a copy of this record on prepared blanks every six months to the Registrar of Vital Statistics. If the foregoing could be accomplished, I think the Registrar could so tabulate what he received as to make them of some practical use. While not as complete as could be desired, still this would be far better than what we now have. I ask you to give this subject your earnest consideration and by requesting the next Legislature to enact such laws that will enable the Registrar to collect and tabulate these statistics in such form as to make them a source of information for those interested in the health and welfare of our State.

An accurate record of such statistics is a great aid to the hygienist, who can, by glancing at the records, determine the health of a town or its neighborhood, trace the fatality of epidemics, ascertain the proportion of deaths to the whole population and the efficiency of preventive measures, and I as one individual will do everything in my power to assist in bringing about these results.

The next paper was that of Dr. Joseph R. Huntt, of Laurel, upon

"FUNERAL REGULATIONS FOR RURAL DISTRICTS."

Dr. Huntt said: Who knows the needs of public protection better than the physician? And we as delegates to a Health

Conference ought to be well versed in preserving health after hearing the discussions which I see the committee has selected.

I see by the programme that we are to hear all about the diagnosis, cause, and prevention of various diseases, but very little is to be said about the disposal of the body after you have diagnosed, found the cause, treated and failed to discover any remedy sufficient to prolong life.

Therefore, I shall attempt to deal with Funeral Regulations for Rural Districts. I believe I represent that portion of the State of Maryland wherein some law should be passed for public protection through burials. Situated as we are in a prosperous up-to-date section of Maryland, adjacent to this great city, and suburban to Washington, both of which have laws that ought to serve as examples, yet, like other more remote parts of the State, it is seemingly a neglected law. No protection, no licensing of undertakers, no restrictions as to who shall bury the dead, but simply do-as-you-please method.

Some improvement or adoption of a general funeral law is a necessity whereby the country districts will receive their share and be in touch with scientific researches of the present day. With increase in population and building up of country towns and villages, wherein no laws exist, the needs are greater for protection and at the same time aid in furnishing statistics which are not obtainable today.

We need a law passed by the next legislature compelling undertakers to register, receive a license and to prohibit burials in any part of the State without first obtaining a certificate of death and the cause thereof, also a permit for burial. Such permits should be issued as in large cities, by a commissioned officer. This should apply to towns and to villages and country districts. Empower the local physician to issue burial permits when the cause of death has been duly ascertained.

The persons issuing permits should keep proper record of deaths, permits issued, and furnish the Secretary of the State Board of Health semi-annually, with complete reports, and by so doing enable him to publish annually the vital statistics of the State, which have never been published correctly.

Such a law may be opposed as unnecessary, but I have known supposed crime to be covered by the soil, and the public none the wiser. Infants have been buried, the cause of death never being ascertained. No post-mortem was held, no physician ever saw the body, no medical service ever secured, no permit for burial issued, and death an unsolved mystery. Thus crime has been committed and repeated, so that today the country districts are the best places for the perpetration of such acts, where anybody buries the dead and no law exists to prevent them.

The danger of spreading contagious diseases by public funerals has, as far as I have personal knowledge, been limited, not as a result of care or law, but public fear. I believe our State Secretary has witnessed almost an epidemic as a result of a public funeral on the Eastern Shore. While I think there is a law governing this, yet it is not within our power to enforce it, because the issuing of permits is not generally required.

The railroads throughout the country have surpassed us in protection by not transporting bodies which have died of contagious diseases. Nor will they transport bodies dying from any other cause, from State to State, without being hermetically sealed.

So the time now comes when we as protectors of public health should step in and urge the licensing of undertakers, and prevent burials without due record being kept, thus restricting the freedom they now possess. We may seem to be interfering with the rights and privileges of others, but since the undertakers prosper by our losses, and we are only benefitted by their covering up our errors, we should not hesitate to suggest anything beneficial to ourselves and the public generally, for as the guardians of health, we are looked to by the public for protection. Even Ex-President Cleveland admits our superior judgment, in his address before the Academy of Medicine in New York, recently, when he said "you have invaded our benighted contentment and led us out into broad fields of scientific discovery."

Believing this to be of paramount importance to country districts, I hope to see the cause pushed along by the profession to the success which it rightly deserves, thus the State may be benefited and the public protected.

Dr. Geo. H. Rohe, of Baltimore, then spoke upon the question,

SHOULD PHYSICIANS BE PAID FOR RETURNS OF BIRTHS, DEATHS, AND DISEASES?

Dr. Rohe said: The following considerations seem to me applicable in the discussion of this question:

Has the State, directly, or through the health department, the right to demand services from physicians without rendering compensation?

The right of the State to demand from any citizen certain services for the public good is inherent in what is comprehensively known as the "police power."

One phase of the exercise of this "police power" is the enactment of certain laws regulating the practice of medicine. In this State, for example, no person may practice medicine or surgery without passing an examination before an examining board

appointed by the State. Persons found by the board incompetent are debarred from practising this profession within the limits of the State. Some have held that the exercise of this power by the State was contrary to the letter or spirit of the Constitution, but courts have generally decided that this contention is not valid, and that the State, by virtue of the police power, can restrict the privilege of its citizens in this direction.

So, also, courts have held that under the authority of the same police power, physicians can be compelled to report to the legally designated authorities the facts connected with deaths occurring within their observation. Similar decisions are on record relating to the reports of contagious or infectious diseases.

It may be assumed without argument, that laws requiring the reports of diseases and deaths are for the public good. Conceding this, any citizen may be required to make such report. As physicians, by virtue of their professional knowledge, are the only persons who can give correct information, it is proper that the State should require them to make the report. Contrary to the opinion sometimes expressed, the State can demand such service without compensation. A Connecticut court has declared that "it is universally understood to be one of the implied and necessary conditions upon which men enter into society and form governments, that sacrifices must sometimes be required of individuals for the general benefit of the community, for which they have no rightful claim to specific compensation." (Bradley *v.* N. Y. & N. H. R. R. Co., 21 Conn., 306.)

It is conceded that the State has no right to take private property without granting compensation, but it is doubtful whether a physician's knowledge or service in this particular would be considered as property. Indeed, courts are often disinclined to allow specific compensation for the special knowledge required of an expert called by the State in criminal cases.

The report of deaths and contagious diseases should be considered by the physician as a high public duty; one that he alone can satisfactorily perform, and for which he should scorn to ask or receive compensation.

Another aspect of the question of the report of contagious diseases is whether such report by the physician is a violation of professional confidence. Aside from the fact that State laws generally do not recognize the physician's knowledge gained in a case as a question of professional privilege, it seems to me that the principle does not apply here. The privilege to suppress knowledge of the existence of an epidemic disease which may, if not prevented, devastate a community, ought to be abridged. Suppose, for example, a case of bubonic plague, now raging in the East, were to succeed in evading quarantine, and come under the notice of a physician acting in his professional capacity in

this city or State. Would any consideration of professional secrecy justify him in suppressing the information, and thus subjecting the community, nay, the entire country, to the danger of infection, by this pestilence?

And if the exotic plague can be reported without a violation of professional confidence, why not our domestic pestilences, scarlet fever, measles, diphtheria, whooping cough, or typhoid fever? I believe the common sense of physicians will unhesitatingly reject the view that the report of contagious diseases is a violation of professional confidence.

There remains to consider the duty of physicians as reporters of births occurring under their care. The law in this and in a number of other cities requires them to make such reports. I am, and always have been, of the opinion that the law is unjust, and that it places a burden upon persons who should not bear it. The report of births and the calculation of the birth rate of a community is not a medical or sanitary question at all. It is a question in demography. Let the parents of the child make the return to the bureau of vital statistics. The doctor, as well as the midwife, should be relieved of all responsibility in connection therewith.

DISCUSSION.

Mr. Chas. B. Rogers, Towson: I had not had the slightest idea and did not come for the purpose of saying anything, but while listening to the papers attentively I was struck forcibly by the fact that the public school system of the State and the health officials should walk hand in hand, and their relations should be as close as possible. It strikes me that in making reports, some plan might be adopted like that suggested by Dr. Fulton, in which two coupons are used, one to be a check upon the other. There are public schools in every locality, there are teachers in every one of them, and a system might be introduced whereby the teachers could be asked, or required to issue a regular report of diseases, and you would secure from that source, accurate reports of the diseases existing in any community. It is quite clear, that if you wish to establish any such system, there must be harmony of action between the public school system and the State Board of Health.

Dr. F. H. Thompson, Annapolis: I have had the compliment of being Health Officer of our capital since 1884. The trouble it seems to me is that we cannot get reports from our physicians, because they are not paid for them. Some physicians make their reports without any trouble, but with others, when I hear of contagious diseases, I have to go and ask for their

reports. In two or three instances, where diseases like scarlet fever have gotten away from us, it has been because I have not had information soon enough. When the information has come early, I have been able to check at once the spread of the disease. My opinion is that we can do little in the way of the prevention of disease, unless we have mandatory laws issuing from the State itself, and making it compulsory for the physician to report his cases. Until we have that, we can get no definite statistics of disease. In my own town there is no provision for the record of burials. I have been able to get the statistics of burials complete for 1894, 1895, and 1896, by going about among the undertakers myself. Unless we have some law requiring the head of the family or the physician in attendance to give in the necessary records as to the prevalence of the disease, I think it will be impossible to get statistics that will be of any use.

Dr. A. K. Bond, Baltimore: We have had this matter largely discussed in our State and city societies, and I think the sum of the whole matter is that the profession lacks confidence in the health officers. I consider that this movement promises better facilities in health work and better administration in the City Hall; the appointment of physicians as inspectors, instead of ex-saloon keepers, is one of the great steps towards securing better statistics. Physicians probably have not sent reports heretofore, because they did not believe it was of any use. I have sent in notice of an infectious disease, and had a drunken inspector visit the house and make himself the laughing stock of the people. Now if we are going to have good health officers, and I believe we are, we shall soon obtain satisfactory statistics. The profession will support anything that is reasonably useful and respectable.

I am not particularly interested in a case of whooping-cough away up in the mountains, or in a case of typhoid fever down in Anne Arundel county. I know that the night soil is sent there and sprinkled on the cabbages which are sold here, but there are certain principles that require first attention. I know if I report a case of whooping-cough to the State Board of Health that nobody is going to quarantine that child for six months, and I know if I get a case of measles and report it, there is no hospital for contagious diseases to put it into, but there are certainly larger things that ought to occupy our attention.

Mr. Weimer, Cumberland, Md.: I traveled nearly two hundred miles to attend this Convention. I am here in the interest of the children, and want to get all the information I possibly can. In my county during this winter, at one time, among 9,000 children, there were at least 3,000 cases of measles. Occasionally we have diphtheria break out. We take all the precaution we can in the schools, but unfortunately we cannot reach the home. We

cannot say what training they have there. Occasionally we have this to contend with: parents persist in sending a child to school whom they know to be sick. I think we should devote more time to educating children in hygienic lines, and possibly as they grow up we shall find them growing stronger and hardier. I did not come here to give statistics and I am not interested particularly in grown people, but I am very greatly interested in the 9,000 children that are committed to my care.

Dr. Fulton: I desire to pass around a few printed slips containing a suggestion in regard to the double coupon system of reporting infectious diseases. In one slip the doctor gives notice to the householder that an infectious disease is present, and on the other the householder acknowledges the notice. The two slips may go to the Health Officer in separate envelopes, or only one may be sent, but I believe it will be found in practice that both slips will be mailed in one enclosure.

Dr. J. H. Billingslea, of Westminster: I would like to say a word about diseases in our schools. I have had in my own district a number of children continuing to attend school daily though they had chicken-pox, and were not, except in a few instances, being treated by any physician. I saw one or two cases in my own practice, and learned that there were a great many others existing at the time. Out of 140 students some seventeen were continuing school at the time they had well-marked cases of chicken-pox. I have been practising medicine over thirty years, and one of the greatest difficulties I find, and others have spoken to me of the same thing, is the jealousy that exists among physicians. Physicians are always surrounded by others, and those who report their cases are apt to be injured in their practice. I would suggest that a plan be adopted by which the physician is required to give a report of the case to the head of the family, and that individual be compelled to report to the Health Officer. There are many cases where the people have little stores, and if the doctor reports a case of infectious disease in that family, it affects business and excites a hostile feeling which other doctors in the neighborhood take advantage of. It brings the doctor making such reports into discredit.

If a law can be had making it mandatory upon the head of the family to send in a report as given by the physician, I believe the latter would do his duty; otherwise I can see how physicians will overlook cases of that sort, or call their cases of diphtheria or scarlet fever mild ones, and therefore not worth reporting.

Dr. August Stabler, Brighton: I am afraid this plan would not be universally satisfactory, for in the county in which I live, Montgomery, there are many people who cannot read and write, and would not know the meaning of a certificate given them, nor how to go about reporting a case if advised to do so. The

physician in the country district is about the only man, except possibly the public school teacher, who can make such reports, and I don't think he should want to shirk such a duty, even if it did for a time injure him with some family. If I should withhold information which the State Board of Health ought to have I would consider that I was a party to a criminal act, and if it was my duty to make such report, I would do it without any reference to its business disadvantages.

The suggestion made that teachers should make a report is, I think, a good one, but there should be some provision made for their remuneration, and some physician should be designated to report to the school teacher as to the existence of disease among patrons of the school. Frequently children are kept at home during the winter months without sending any information as to why they are not at school. I happen to be a trustee in our school, and I know that during the winter months the attendance is often very small, and the teacher does not know why. If a physician should report to the school teacher all cases of infectious disease among the children that attend that school, it seems to me some good might be accomplished, but I doubt whether such a scheme can be carried out unless there is some remuneration for the service.

There are now in our neighborhood a number of children with chicken-pox and there is no restriction upon their attending school. My children are affected with it and I have kept them at home for weeks, but I know of other children who were kept away from school but two days; only as long as they were really unable to go. So far as the disease is concerned, school teachers do not pay any attention to it at all. Other diseases are completely overlooked. Measles can be carried by the clothing into the school even though the child has not the disease itself. Any of the children's eruptive fevers can be carried in that way. This is a matter of vital importance because there is no better way of disseminating infectious diseases than through the public schools.

Dr. T. A. Councell, Easton: When I was first appointed health officer in my town everybody seemed to be against me on account of my youth. My first step was to go to the Board of Town Commissioners of Easton and ask them to pass some ordinance whereby we could collect useful statistics. They proved to be broad-minded men and made an ordinance which provided that any physician attending a case of contagious disease should give immediate information to the Commissioners, and then report to the health officer. In the other towns in my county I have been unable so far to get such co-operation, but perhaps it is my own fault.

I have found it a pleasant duty to go to the young lady school teachers and talk to them about such matters. They are in hearty co-operation with us, and some ten of them have reported to me every case of acute sore throat.

Member. Are you a bachelor?

Dr. Councell: I was. Certain teachers take pride in trying to keep the health of their particular schools above that of the other schools. I have found no trouble in getting them to report any cases of disease among their pupils. Since the diphtheria scare in St. Michael's, I think we have not had a single case of infectious disease in Easton.

Dr. W. J. Todd of Mount Washington: If I explain to the families the advantages of isolation, I have no trouble in getting them to keep the children home from school. During the last epidemic of scarlet fever in Mount Washington, I advised the principal of the school to send home any child she suspected of being sick. She sent home about twenty. I told her that by doing so she would throw the reponsibility upon the parents, and that they would consult a physician. I am a trustee of our school, and when I find a contagious disease in the village, either in my own practice or that of other physicians, I advise the principal of the school, and she is on the alert. I am also in professional attendance at a private school in Mount Washington. It is a boarding school, but they have day pupils and I find no trouble in either public or private school to get the authorities to act with me on such matters.

Dr. E. T. Bishop, Smithsburg: My experience has been such that it seems to me it will be a very difficult thing indeed, to get a law that will compel physicians to report cases of contagious or infectious diseases, for the reason that it is very seriously against the interest of the physician himself. In my experience as a physician I have had the misfortune to have cases of small-pox under my care, and living away in the country, and out of the reach of any hospital conveniences, I have had the personal care of those cases to my very serious financial detriment. As soon as I had said within the family circle what that case was, the report begun to spread through the community and that was the last case I had until the patient was well and out of doors. I have used every device and have walked miles across country to prevent the knowledge spreading that I was connected with such a case, but without effect. I mention this merely that the assembly may have a full knowledge of the different sides of the question. I had a family of six children and from the moment I had a case of small-pox in my practice, their source of supplies were cut off. Now what are you going to do about such things?

Mr. Chas. Hartshorne, Brighton: It will not do for a layman to attempt to answer this question. It seems to me a very

unfortunate case, but I do not see how the reporting of those cases would have made the condition any worse. I think the condition might be improved if we had local boards of health in each community; boards that are active and up to their duty. Our board has been in existence for a number of years and is very active, some of the physicians taking a very earnest interest in it. I see one of our members on the other side of the room now. A year or so ago some of us thought that we should work up the question of vital statistics and we suggested it to the Board, but it didn't find favor with the physicians. We did succeed, however, in one very essential matter, that is, that all cases of infections diseases are now reported to the local Board of Health. Our meetings take place every three months, and each physician reports as to the health of his neighborhood.

This question of getting statistics though is a very different thing and requires more accuracy. It is very difficult but I believe it can be accomplished more certainly now than ever before. I believe that we ought to have local Boards of Health to secure these statistics and furnish them to the State Board, and a plan could be devised by which one report would be a check upon another. It would be well I think to have the school teachers report. They do not always carry out their instructions though. I remember some years ago a small-pox scare during which we had reason to doubt that the law requiring school children to be vaccinated was being carried out. We went to the county School Board to send notices to all the teachers that it was necessary to comply with this law. One of the teachers, living within a few hundred yards of Dr. Stabler, was considerably disturbed about it. No vaccine physician was about there and she asked if she could have Dr. Stabler to vaccinate her scholars. I should like to ask Dr. Stabler how many of those children he vaccinated and how many needed it.

Dr. Stabler: I could not say from memory but I think I vaccinated nearly the entire school and a very large proportion had vacinia.

Mr. Hartshorne: I think 35 out of 36 took.

The point is that here were a number of unvaccinated children allowed to attend school, without regard to the law, which was not even known to some of the people. If we had local Health Officers with whom the school teachers like to correspond, as is the happy case in Talbot county, the conditions might be improved. In our local Board of Health in Montgomery county we frequently have meeting after meeting with nothing to do, and we get to think at times that perhaps there is no need of a Board of Health, but we always conclude that it is better to keep up the organization, for the time might come when it would be of

very great use, and I think if these local organizations are given encouragement, and some regular work to do, that they will prove valuable aids to the State Board.

Now as to this question of funerals; as Dr. Stabler has said, a good many of our people are illiterate. A certain number of cases of diphtheria occur, we will say, among the colored people, and I recall one instance where, despite the fact that they had been told of the great danger, they held a public funeral. There were thirty or forty people in a small room, the coffin was open and the corpse exposed. Within the last month a member of our Board of Health told me of a colored family in which a child died with diphtheria. He advised them not to have a funeral, but this was an important child and had to have a good send off.

Dr. J. McPherson Scott, of Hagerstown: The vaccination of children is supposed to be the best means of preventing the spread of variola. I assume, therefore, that this law is a good one, and every child in the State ought to be vaccinated whether it goes to school or not. If vaccine is a preventive, it is a fundumental principle that the child should be vaccinated whether it attends school or not. As to whether the teacher is to be deprived of his income because the parents refuse to have their children vaccinated, I don't think has any place in this discussion. That my child and others are to be subjected to the dangers of small-pox because the majority of parents in some particular districts refuse to take precautionary measures is hardly a fair proposition. If the community cannot afford to keep the schools open under such circumstances they had better be closed. If I knew that a case of contagious disease existed and had not been reported, I should inflict the penalty of the law. I am not responsible for the hardships of the law. If you have a bad law enforce it, and you will get a better one.

Dr. Thomas B. Owings, of Ellicott City: There is no more certain means of disseminating disease than through our public schools, and as the Health Officer of Howard County I have had a great deal of trouble to get the physicians to notify me of contagious diseases, but whenever I hear of a contagious disease in any community, I go into that community and make inquiry for myself, and as my relations with the school board of Howard county are of the closest and best, when it is not possible to reach the school board or the examiner at once, I give an order to the teacher not only to send home a child in whose home there is a case of contagious disease, and to keep that child away for thirty days, but I also notify the proper officer of the school board, and in some instances have suggested to him the propriety of closing the schools in order to prevent the dissemination of diseases.

I think the State Board of Health is all the Committee we need to urge legislation upon this point. We don't want more health officers in the rural regions; we want more law and that law enforced; we want the physicians to report to the heath officer, and he can make a report to the State Board. If Dr. Fulton will send out letters asking the co-operation of the different health officers of the counties he will, I think, get all the assistance necessary to improve the condition of things now existing. The physicians object to reporting their cases because they say they are not paid for that, and it will be necessary to either pay them or compel them.

What we all want is the best we can get, getting what we may in the near future, and with ability improve it by experience; that is my understanding of the purposes of this Conference. To the physician who spoke of reporting whooping-cough, I would like to give one case to show that whooping-cough is not the trifling thing that it is often supposed to be. I saw a family with two children having whooping cough, told them what it was and told them not to let the children go to school until they had my permission. Two days later they went to school with a lie in their mouths. What was the result? Sixty-eight children attending that school, forty-seven with whooping-cough, two died of pneumonia, and now there are three very ill.

Dr. W. A. Duvall, of Baltimore: The suggestion of the gentleman from Howard county would seem to be the thing. It seems to me that the local Health Board, if I may be permitted to offer a suggesiion, should be the school trustees for the district, together with a physician. I say this for the reason of its popularity. In order to carry out a law, those charged with its execution should be held in a certain amount of esteem by those around them. Sometimes the physician is not as popular as he might be, and therefore could not execute the law. Some positions in the Health Department are better filled, I think, by the laymen than by the physician; I say that in reply to my friend Dr. Bond. I was once connected with the Health Department of Baltimore. I was not an ex-saloon keeper, but I believe there are positions there that a physicion would not desire tô fill. I think they should be filled by the best people we can get.

If the trustees of the school, two gentlemen of the laity, and one physician, constituted a local health board, and that physician was required to visit the school, examine the children and get paid for it, (for I don't believe in requiring a man to work with out pay), it seems to me that we would have no trouble in carrying out the laws as we have them.

Dr. George C. Steuart, of Oxen Hill: It seems to me that we have this law, and the question is who shall carry it out? Are the health officers to do so? Will the local health board

back you up in doing so? Who will put a penalty upon me for not vaccinating a child, or upon the parent or guardian of a child who has not been vaccinated? It is law, but who will enforce it? The proper way is to have a local health board in every county and every district of every county.

Dr. John S. Fulton: If any one feature of this morning's session has more than another gratified me, it is the interest shown by the authorities of the public schools of the State of Maryland. It was my fear that this would be the driest session of our Conference, and the one that would excite the least discussion, but the facts have been quite contrary to my anticipation. We have been led somewhat astray into a discussion of vaccinia, and while I would like to talk upon that subject, there is so much work already cut out for us that we must confine ourselves to the questions raised in the papers. As to the necessity for laws relating to Vital Statistics, we have had illustrations of that need presented today by speakers from different sections of the State. Dr. Mattfeldt and Dr. Huntt both spoke of the easy concealment of crime. There is no greater fallacy than the saying that murder will out. Many of you know of probable homicides that have never been investigated. They escape detection because we have no funeral laws. Several gentlemen present here can commit murder with less risk of detection than they could commit petty larceny. There is nothing in the laws of Maryland to prevent the importation by land of infectious disease, except the care that the transportation companies exercise in accepting dead bodies.

The suggestion of Col. Rogers regarding school reports is a valuable one. It is new to Maryland but not elsewhere. I hope Col. Rogers will have something to say on this subject tonight, when the relations of the school to diphtheria are considered.

I hope also, that Dr. Rohe will take this opportunity to discuss the question of professional confidence. I am convinced that confidence is not in any way violated by the notification of infectious disease. It is perhaps an injury to the physician in his business relations with a benighted public to report that which his patient foolishly wishes to conceal, and, therefore, the responsibility should be placed upon those whose interests are most involved. The physician should formally notify the householder that there is in his family a case of infectious disease, and should disclaim all responsibility except for the exercise of professional skill and care in the one infected room. Physicians cannot practice disinfection. They cannot afford to if they have the skill and the inclination. Neither can they enforce isolation. There is no man here bold enough to say that he habitually does in an effective manner either the one or the other.

I cannot see that illiteracy is any bar to the compulsory notification of disease. Are illiterate people so numerous, or is their

practice so valuable that any man, in the line of duty, hesitates to forfeit somewhat of their good will for a short time? One must especially regret that there is such an amount of illiteracy in Montgomery county, for I had concluded that it was the star county of the State in health matters. I became acquainted through Dr. Martin with their Mr. Hallowell, who has been able to keep alive an active and purely voluntary health board, and has sent the largest delegation present here. It is difficult to believe that the people of Sandy Springs are so shockingly illiterate.

Dr. Bond's case of whooping-cough on the remotest mountain in Maryland is as important as a similar case in Baltimore. Its isolation and its mildness both invite neglect. Pre eminently, the so-called sporadic case of infectious disease is that with which we are concerned, for in it we have the seeds of epidemic, and it is far easier to destroy the seed than to root up a crop. This principle is at the base of the subject. No degrees of infectiousness may be admitted, nor any type of virulence. Every case of infection is but a link in a series. It is our province to make it the last one. Although the case may not reveal its parentage, you are not ignorant of its ancestry, and if you do not treat its present with respect to its past, you may come to look upon its future with remorse. A man, who attends cases of infectious disease, assumes extraordinary responsibilities, and such work will inevitably cost him more than attendance upon ordinary illness. The testimony here today is unanimous that such services are expensive, and those who tried hardest to evade the extra cost have been most heavily mulcted of their time, money, and reputation. On the low ground of selfish expediency, the best argument for the compulsory notification of infectious disease is furnished by those gentlemen who have spoken adversely. The existence of infectious disease cannot be systematically concealed by any sort of device. Attempts at concealment, whether successful or not, are more injurious to reputation and character than the notification according to law would be.

Dr. A. K. Bond: I must arise to defend myself. I don't approve of whooping-cough children going to school, but I think we ought to go after the graver diseases, and not bother to put a fine of two hundred dollars upon a man who doesn't report a case of mumps. I know that in the poorer families in the city you cannot isolate the patients. Because a man burns sulphur in the room, that doesn't prevent the disease; the Chinese beat tom-toms with just as much effect.

Dr. Geo. H. Rohe: There has been some disinclination to accept my view of the question that no one should be paid for making reports, but there has been such a general agreement with me that I do not think it necessary to make any reply. I

merely want to ask this: Can a doctor take ten cents for the notification of a disease or writing a death certificate? If he can, he ought to have it. If he can afford it I say he certainly ought to have it. He can't ask a dollar, for the State cannot afford that. I hear Dr. Bond, who thinks the doctor ought to be paid, say "Poor State." The State can pay ten cents, but no respectable practitioner can do that work well and accept such a trifle for it.

There is an important question raised in this slip of Dr. Fulton's; that is, the complicated machinery used in getting the report from the case of disease, or death, to the authorities. It is just as much trouble for a doctor to write a certificate, for the family, that the child has measles, as it is to sign a certificate, put it in the letter-box, and let it go direct to the health officer. It doesn't relieve him of any responsibility. If he has any doubt that Robert Brown will send it to the health officer, it is his duty to go himself and give the report. The simpler these laws can be made the more likely they are to be carried into effect. I cannot see why any certificate of this sort should release the physician of any responsibility in the matter. In the ordinary course of his duty he has already notified the householders that the child has measles. It doesn't make it any more certain that the certificate will get to the health office than if he sent it himself. The municipalities do not make much trouble for the doctor. They give him a printed slip which requires very little labor to fill out. This would only complicate matters, mistakes would be multiplied indefinitely, and the time between the making of the certificate and its receipt by the health officer would be so great as to a large extent nullify the good effects of the law. I think it is not a doctor's bnsiness to report births. If the State insists on that point he has it to do, but it is not properly a part of his duty, for it is not medical statistics.

Dr. Scott, of Hagerstown: I don't think we are ten cent men nor that Maryland is a ten cent State. The State has no right to make demands of us. My education is mine, and I have the right to be reimbursed for my use of it. I would like to see this conference formulate some plan whereby we could get a report of cases such as would make the vital statistics of the State valuable. I don't think the physician wants anything for the mere reporting of contagious diseases, but when he has to sit down and fill out a blank letter that is submitted to him for both sickness and death, it takes a great deal of time, and he ought to be compensated for it.

Dr. W. J. Todd of Mount Washington: Mr. Chairman, I would like to offer a resolution providing for the appointment of a local health officer in each electoral district, and further that vaccine points be considered a part of a school supplies, and that

each child shall be retained in the house for a period of thirty days after recovery from any infectious disease.

DR. GEO. H. ROHE: I would suggest that a subject of that kind, more properly comes before the Executive Committee, which is provided for by the programme, and that at present, only the discussion be taken up, or if this resolution is received now that it be referred to a committee on resolutions.

DR. C. L. MATTFELDT of Catonsville: Mr. Chairman, I move that a committee of ten be appointed to secure the necessary legislation providing for the appointment of three or more health officers in each county of the State of Maryland, said officers to report to the central office at Baltimore.

DR. SCHAEFFER: Dr. Mattfeldt's motion has been seconded and is before the house.

DR. MATTFELDT: I would like to state that I suggested three health officers for each county, mainly for the reason that I thought that if there were only one there might be some difficulty at times in securing certificates.

DR. STABLER of Brighton: For that very reason there ought to be just as many for the same amount of territory in a sparsely settled community as in the more populous regions. A single officer in such a case would be difficult to get at and would not have the oversight of the whole county. There would be many excuses for non-fulfillment of his duty. It seems to me one health officer from each election district would be better.

DR. SCOTT of Hagerstown: Mr. Chairman, I move that this resolution be referred to the State Board of Health.

DR. SCHAEFFER: Dr. Scott's motion to refer Dr. Mattfeldt's resolution to the State Board of Health has been seconded and is before the house. (Vote taken.) The motion is unanimously carried and the resolution is so referred.

The Conference then adjourned until 8 o'clock P. M.

MINUTES OF THE EVENING SESSION.

WEDNESDAY, FEBRUARY 17TH, 1897.

The meeting was called to order at 8.15 P. M. by Dr. S. Chase de Krafft, who introduced as Chairman of the evening the Hon. Harry M. Clabaugh, Attorney-General of Maryland.

MR. CLABAUGH said: When I was invited to preside at the evening session of this Conference, a proviso was made that I should not make any remarks, and I do not therefore want to transgress. I wish to be permitted to say this, however, that the

Board of Health, of which I am the only lay member, is endeavoring through the active efforts of its secretary to do everything they possibly can to render to the State the services for which it was formed. I need not say that these services will be contracted unless we have the co-operation of the medical men throughout the State. I think this meeting augurs well for the work laid out by the Secretary, and I trust that this meeting is but the forerunner of many more that will be largely attended.

Upon me personally, membership in the Board of Health has had a very demoralizing effect. I came into the Board, ex-officio, hoping, believing that certain definite things that I had always heard were true. For instance, I believed that milk was a healthy product and that its use was to be encouraged. At my very first meeting with the Board I learned that it was a dangerous thing to drink milk. I became convinced that tuberculosis was prevailing to a most alarming degree, and I inquired if it could not be prevented. I was told that there was an antidote and when I inquired what it was and how it was used they told me that it had some sort of stupefying effect upon the microbes, and that if you could get them into that state the milk was perfectly healthy. It took two ounces of milk and two of the antidote which was—spiritus frumenti. I have tried the compound and it is good. They say that as to the dose of it, there is a great deal of latitude. Authorities differ as to the amount that may be taken. Some say that you must be sure to take enough while others caution one not to take too much. Some eight or ten years ago I was trying a will case in which the testimony of a physician was very material. The lawyer on the other side said, "Doctor, you use very little medicine I believe; in other words, you believe in small doses." I think perhaps he was a homeopath, and he said in answer "I believe in small doses if that is all that is needed, but if necessary, I would give a bucket full."

I always thought cats were very harmless animals, and my children are very fond of them, but at a recent meeting of the Board it was said that cats are subject to diphtheria. I assure you that this distresses me more than the milk question, and I hope during the evening to learn among other things whether cats can convey diphtheria.

The first subject on the programme is "A Bacteriological Demonstration of Diphtheria" by Dr. W. Royal Stokes, Baltimore City Bacteriologist.

BACTERIOLOGICAL DEMONSTRATION OF DIPHTHERIA.

By Dr. Wm. Royal Stokes, of Baltimore.

Within the past few years various municipal governments have established well equipped bacteriological laboratories, where physicians may take advantage of the aid afforded by the many modern scientific diagnostic tests.

Among the most useful of these may be mentioned the bacterial test for diphtheria.

It is hardly necessary to remind you that many fibrinous, as well as other inflammations of the throat and air passages are due to the presence of a specific germ called the diphtheria bacillus.

This bacillus may be easily recognized when present in the inflamed respiratory tract by means of a very simple method. This method is based upon the fact, that when the germ of diphtheria is placed upon the slanted surface of coagulated blood serum, within a sterile test tube, a rapid reproduction of the organism takes place, even to the exclusion of other bacteria, if present.

Paper boxes containing a sterile cotton swab and tube of coagulated blood serum are placed at various points convenient to physicians. In a case of suspected diphtheria, the cotton swab is gently rubbed over the surface of the inflamed portions of the throat and tonsils, and this swab, containing the secretions of the throat, is then smeared over the surface of the blood serum. The tubes are then returned to the laboratory and placed in an incubator, maintained at the temperature of the human body (about 35°C.) and are allowed to grow for twelve hours. At the end of that time , if the bacillus of diphtheria be present, it makes its appearance on the surface of the serum as numerous yellow, small, elevated dots, or a more diffuse, homogeneous growth, consisting of many thousands of individual bacteria. These collections are called colonies.

A small portion of these colonies is then transferred to a glass slide, and spread over a large area by means of dilution in a drop of water. After drying, the specimen is stained by means of an aniline stain called Loeffler's methylene blue and the slide, containing the bacteria, is then ready for microscopical examination. The bacillus of diphtheria can be easily recognized if present, owing to its characteristic staining properties. This organism will only take up the stain at either end of its body, while all of the other bacteria present will stain throughout their entire extent, The diphtheria germ, therefore, stands out as a light-blue rod with dark club-shaped ends, and can always be differentiated from any other bacterium present.

At times, however, in normal throats, there exists a germ called the pseudo-diphtheria bacillus. This differs from the true diphtheria bacillus in possessing pointed ends, in staining regularly and in its failure to kill guinea pigs after inoculation. After growth for twenty-four hours it may be generally distinguished from the real organism by its failure to produce an acid in a solution of sugar in beef tea. The diphtheria germ causes the production of an acid, which can readily be discovered by simply placing a small drop of the fluid on a piece of blue litmus paper. The latter will of course turn red in the presence of the acid and remain unchanged by fluid culture of the pseudo-diphtheria bacillus. This organism can usually be easily distinguished from its more dangerous cousin by its regular staining and pointed ends, and no further experiments are necessary.

Thus, the physician is enabled to secure an accurate diagnosis twelve hours after his first visit. This is not only useful in regard to the treatment of doubtful cases, but it is also of value in affording a means of isolating cases of diphtheria until the throat is free from germs and all danger of infecting the surrounding community is over.

A number of observers have pointed out the fact that diphtheria is often spread by means of the convalescent. The germs of this disease often remain in the throat for several weeks after all signs of the disease have disappeared. These bacteria are often virulent, even after so long an existence in the healing tissues, and are capable of causing the death of a guinea pig. Individuals possessing such dangerous organisms can easily infect other persons either through the practice of kissing, or by means of the varions irresponsible acts of children. The practice of transferring candy, slate pencils, etc., from one mouth to another may also introduce dipptheria bacillus from the mouth of a convalescent to that of a healthy child. Diphtheria, therefore, in most cases, must be caused by the actual transference of the bacillus from one throat to another, often by means of some intermediate infected agent. These, and many other possibilities of infection render it absolutely necessary that several careful bacteriological examinations should end in negative results, before the patient is allowed to mingle with the public.

At times, simple inflamed throats, or even typical attacks of follicular tonsilitis, are due to the diphtheria bacillus, and these conditions can only be accurately diagnosed by means of the microscope.

One of the most characteristic results of the presence of diphtheria in the respiratory tract is the formation of a grayish membrane. This may merely be present on the tonsils, or it may involve the entire tract and even cause death by suffocation from narrowing the lumen of the trachea, or windpipe.

This membrane consists of fine interlacing threads of a material called fibrin, including within its meshes many pus cells and numerous diphtheria bacilli. The latter not only bring about local changes, but they form a powerful poison at this area of local inflammation which is absorbed and carried into the circulation. This poison or toxine is the most frequent cause of death in neglected diphtheria.

Fortunately, in antitoxine we possess a most valuable method of counteracting the effects of this poison, and a few words in regard to its manufacture may not be ill-timed.

The production of a toxine or poison by the diphtheria bacillus has been mentioned. This toxine is secured in a concentrated form by means of the following procedure:

Large flasks of sterile beef tea are inoculated with a pure culture of the diphtheria germ, and this fluid is allowed to remain undisturbed for from ten to thirty days. By this time a large deposit has taken place in the fluid, consisting of myriads of bacteria. This fluid is then filtered through unglazed porcelain, and the clear filterate is found to contain a very powerful poison in solution, capable of causing the death of guinea pigs in very small doses. About 0.015 of one cubic centimeter would kill a guinea pig weighing 300 grammes. Roughly speaking, about 3 cubic centimeters, or 45 drops, would kill a man weighing 70 kilogrammes, or 140 pounds.

This fluid is now injected into the tissues of a healthy horse, beginning with doses as small as 0.5 of one cubic centimeter. This dose is gradually increased until in about eighty days the animal can stand as large a dose as 250 cubic centimeters, or about one-fourth of a quart. The animal is then immune, or incapable of contracting diphtheria, and the blood serum of such an animal is capable of protecting other animals against the poison of diphtheria even after the disease has become established. This blood serum forms the clinical remedy known as anti-toxine and is made by withdrawing the blood of the horse from the jugular vein and allowing the serum to separate from the clot. This fluid is then put into small bottles and with the addition of some antiseptic is marketed as a cure for diphtheria. A visit to any laboratory will show that these experiments are performed without causing any greater pain to the horse than that of a needle puncture.

The results of this remedy, as used by hypodermic injection, have been most gratifying, and numerous tables can be cited to show the great reduction in the mortality from diphtheria which has followed its use.

The American Pediatric Society has lately published a report upon 3,384 cases of diphtheria with antitoxine, in which the mortality was only thirteen per cent. The New York Health

Board statistics show a mortality of seventeen per cent., while Chicago only gives 6.4 per cent. Welch's tables give a mortality of about seventeen per cent. in 7,000 cases. These figures, as compared to a mortality of about fifty per cent. previous to the use of antitoxine, are very striking.

Let us close with a quotation from Welch's article. He says: "Anti-diphtheritic serum is a specific curative agent for diphtheria and it is the duty of the physician to use it."

CLINICAL AND BACTERIOLOGICAL DIAGNOSIS OF DIPHTHERIA.

By Prof. William H. Welch, M. D., of Baltimore.

As I was unable to be present at the morning session, I will take advantage of this opportunity to express my conviction of the great significance of this Conference. It inaugurates an important movement in the interests of public health in this State. By bringing together persons from various professions and walks of life, it will spread an intelligent interest in sanitary matters; it will lead to the education of the general public as to the importance of public hygiene, and it should secure co-operation on the part of the great body of physicians with the efforts of municipal and State Boards of Health. There should result an educated public sentiment to support well-directed efforts of the officers of public health, to demand new sanitary legislation when needed, and adequate means to carry out sanitary regulations and to aid in the solution of sanitary problems. The success of this conference will, I trust, lead to a permanent organization with similar purposes and widened scope, an organization capable of being of material assistance to the various Boards of Health throughout this State.

To turn to the theme which has been assigned to me on this occasion, I must express a certain feeling of hesitation in talking before a mixed audience about the harmful bacteria. A half knowledge concerning the living germs of disease is calculated to give rise to exaggerated and alarming apprehensions which a fuller knowledge of the subject would correct. The general public entertains sentiments of great animosity toward all those members of the vegetable kingdom which are called "bacteria." They hear only of those bacteria which cause disease and little or nothing of the vastly greater number of bacterial species which are not at all harmful and many of which, indeed, are of the utmost service to mankind. The very existence and continuance of life upon this globe are dependent upon the activities of these lowly and much abused organisms. One might, with equal

justice, cherish hostile feelings towards all the higher plants, because among them are a few poisonous species. The friendly bacteria have not received their deserts in public estimation. The mere statement that water, or milk, or various substances with which we come in contact, contain so many bacteria, is of very little significance. It all depends upon whether harmful bacteria are present, and, fortunately such bacteria are the exception and not the rule. Again, in this preface to what I have to say, I would call to your minds that we are fortunately provided by nature with admirable and manifold means of defense against the invasion and injurious action of even most of the harmful bacteria which we may chance to receive.

Dr. Stokes has already desribed to you the general characters of the diphtheria bacillus. He has demonstrated how it can be recognized and what use is made of it in the diagnosis of diphtheria, as well as many of the practical applications of this discovery. There is no longer any doubt in the minds of those who are fully informed upon the subject that the Klebs-Loeffler or diphtheria bacillus is the sole specific cause of diphtheria. Every inflammation of a mucous membrance or other exposed surface that is caused by this bacillus is diphtheria, and any inflammation that is not caused by this bacillus is not diphtheria. But the mere demonstration that this organism is the cause of diphtheria simply confirms the faith of enlightened physicians that all infectious diseases are caused by micro organisms. The practitioner of medicine has the right to inquire what practical results have come from the discovery, and to this inquiry it may be replied that there is perhaps no single bacterial discovery which has led to such important practical results as has that of the diphtheria bacillus. This discovery has shed light upon the causation and mode of spread of diphtheria; it has elucidated the real nature of the disease; it has furnished a positive means of recognizing the disease and distinguishing it from other affections, and, above all, it has led to a method of treatment far surpassing in efficacy all other known methods. Those who demand immediate practical results from scientific discoveries ought surely to be satisfied with the outcome in this respect from the discovery of the bacillus of diphtheria.

The old discussion as to whether diphtheria is a local or a general disease has lost all significance in the light of the discovery of the bacillus of diphtheria and the study of its properties. One of the most important attributes of this bacillus is its power to produce a chemical poison of appalling potency. This poison may be compared in a general way, and as to some of its properties, to the poison secreted by a venomous serpent. In diphtheria the bacillus itself grows only or chiefly at the point of invasion, which is usually the throat, and in its neighborhood, where it

leads to inflammation, generally with the formation of a false membrane. Here, growing only superficially in the membrane, the bacilli secrete their terrible poison or toxine, which is absorbed into the circulation and causes the grave constitutional symptoms of the disease and serious damage to remote parts, such as the heart and the kidneys. The local lesion, the false membrane, is caused directly by the bacilli; the general symptoms and distant lesions are the result of the action of the specific poison.

The subject of serum therapy or the treatment of diphtheria by anti-toxine does not belong to my theme, and I shall only say in this connection that the efficacy of this treatment has passed beyond the experimental stage, and is settled beyond all doubt. Antitoxine, where generally employed, has reduced the fatality from diphtheria at least fifty per cent. Thousands of lives have already been saved by its use, and countless thousands will be saved in the future by a discovery resting entirely upon the results of experimentation upon animals.

The diphtheria bacillus affords a positive and practically unfailing means of diagnosis of the disease diphtheria, and it is more particularly to this aspect of the subject that I have been requested, in the division of the general theme, to direct your attention. The possibility of this accurate diagnosis signifies much for the practitioner and for the patient.

Before the discovery of the bacillus of diphtheria the disease was diagnosed by certain symptoms and lesions, the most characteristic feature being the presence of a false membrane. This constitutes the clinical diagnosis of diphtheria and it still remains the most available method of diagnosis for the body of medical practitioners. The bacteriological diagnosis of diphtheria is not to be regarded as intended to supplant the clinical diagnosis or in any sense as antagonistic to the clinical method. It is simply a valuable additional aid in diagnosis, in many cases simply confirmatory of a diagnosis reasonably certain upon purely clinical grounds, and in doubtful cases of decisive importance. For the scientific study of many problems relating to diphtheria, bacteriological diagnoses of all cases studied are essential.

The question is of much practical importance whether the diagnosis of diphtheria by bacteriological methods necessitates any material readjustment of the views which had been reached by the anatomical and clinical study of the disease. In my opinion no such readjustment of these views is required as would appear from some of the writings upon this subject. Our experience here in Baltimore has been that over 90 per cent. of the primary pseudo-membranous inflammation of the throat, which the physician upon clinical grounds alone would confidently diagnose as diphtheria, are in fact genuine diphtheria, capable of demonstration as such by the detection of the Klebs-Loeffler

bacillus. Statements, based upon the examination of large series of suspected cases of diptheria, to the effect that not more than 60 to 75 per cent. of the cases are genuine bacillar diphtheria, are in a measure misleading, and it is not to be understood that all of these suspected cases relate to primary, pseudo-membraneous inflammations about the nature of which the practitioner would not be in doubt upon clinical grounds. It sometimes requires repeated, painstaking examination to detect the diphtheria bacilli in diphtheric exudates, although, as a rule, they can be found without much difficulty. So far, then, as these primary pseudo-membranous inflammations of the throat are concerned, no important readjustment of diagnosis is required as the result of bacteriological studies. Not a few, however, of the pseudo-membranous inflammations of the throat secondary to scarlet fever and other acute infections are due to other organisms than the Loeffler bacillus, and are, therefore, not true diphtheria. The primary membranous croups are nearly all diphtheria.

But it is in the doubtful cases and more particularly in the milder inflammations of the throat with little or no false membrane, that the bacteriological diagnosis is of prime service. Here the clinical diagnosis alone is generally not decisive. Some have been very reluctant to include these mild cases under diphtheria, but the conception that diphtheria may manifest itself in the form of mild, non-membranous, inflammations was not introduced by the bacteriologists. There were not a few excellent clinicians who advocated this doctrine long before the bacteriological era. One sometimes hears today the statement that bacteriologists demand that every throat harboring the Loeffler bacillus should be regarded as affected with diphtheria. Such a view is as ridiculous as to consider the presence of the streptococcus upon the healthy skin as indicative of erysipelas. The bacillus must not only be present but it must be doing harm by unfolding its pathogenic activities, that is by setting up inflammation. The whole point, however, is that this inflammation may be mild, without membrane, as well as severe, necrotic, with membrane, and the mild, non-membranous inflammations are just as truly diphtheria as are the membranous types. The presence of diphtheria bacilli in healthy throats, which have not recently been the seat of diphtheria or which do not subsequently become diphtheric, is a rare occurrence. The recognition of the mild cases of diphtheria, which can be positively diagnosed only by bacteriological examination, is of no little practical importance, for such mild cases may become severe, and they are capable of spreading the disease to others, even in malignant form.

The physician will do well during periods of prevalence of diphtheria to consider all sore throats in children, certainly all in households where undoubted diphtheria exists, as suspicious of

diphtheria. The explanation of the relative mildness of the inflammation in some cases of infection with the diphtheria bacillus may sometimes be the weakened virulence of the infecting bacillus, but it is more frequently attributable to more than usual resistance on the part of the individual to this organism.

As the chairman of this meeting has alluded to the prevalent belief that cats may acquire diphtheria, and be the means of transmitting it to human beings, I may be permitted to touch upon this point, although it is not strictly relevant to my theme. Noah Webster, in his curious book on "Epidemic and Pestilential Diseases," published at the end of the last century, noted the coincidence of cat distempers with malignant sore throat. More recently Klein has brought together the evidence on this point and thinks that observations which he has made, support the popular belief, but his observations do not seem to me convincing. In an address before the Medical and Chirurgical Faculty of this State about five years ago, I referred to this matter and expressed a desire to make bacteriological examinations of cats suspected to have diphtheria or to be agents of conveyance of the disease, but no opportunity for such examination has presented itself. In my judgment there is no conclusive evidence that cats are ever spontaneously infected with the diphtheria bacillus, although they are susceptible to experimental inoculation with it.

It is not to be expected that the practitioner of medicine, as a rule, will himself make bacteriological examinations in cases of suspected diphtheria. Relatively few have either the training or the appliances for such examinations, even if they have the time. Students who are now educated in our best medical schools are taught bacteriological methods, and in their future practice should be able to make such examinations as those required for the bacteriological diagnosis of diphtheria. From what has been said, the clinical diagnosis in many cases is sufficiently positive for all practical purposes. The physician should not delay the use of antitoxine in suspected cases of diphtheria in order to await the results of bacteriological examination. There remain, however, a sufficient number of cases where it is of the utmost importance that means should be at the disposal of the physician through which he can secure the advantages of bacteriological examinations by skilled experts. Nor is it simpiy for purposes of diagnosis that such examinations may be required.

I would, therefore, in conclusion, emphasize the great value to the medical profession and to the interests of public health of the establishment of well equipped and properly directed bacteriological laboratories in connection with the municipal and State Boards of Health.

A model in this respect is the laboratory of the Health Department of New York City, which has already accomplished results

demonstrating the great benefits to the medical profession and the general public of such laboratories. The impulse for the establishment of this laboratory was the cholera scare a few years ago. The fear of Asiatic cholera has been one of the great levers of sanitary reform in this century. Here in Baltimore a bacteriological laboratory has been started in connection with the Health Department. It should receive the hearty support of the medical profession, and its capacity for usefulness should be extended by ampler provisions for its support, whereby it may be made more serviceable, not only to this city, but to the entire State.

PERSONAL AND DOMESTIC PROPHYLAXIS.

By Dr. John D. Blake, of Baltimore.

Personal and domestic Prophylaxis presents such an enormous scope, and the time placed at my disposal to prepare for its proper discussion so short, that I almost shrink from the task imposed.

To properly treat so important a subject one should be a thoroughly equipped bacteriologist, a competent pathologist, a good sanitarian, a professional chemist, and a competent engineer. It goes without saying, therefore, (as I do not pretend to claim any such equipment), that these subjects can only be very feebly treated by me on this occasion. What I shall say, therefore, will be along the line of personal experience, with practical suggestions as to the proper method of dealing with contagious diseases.

In the earlier days of hygiene, when the cause of disease was less understood and the whole subject was in its infancy, it was thought a much more easy task to successfully deal with it than now. As bacteriological investigations go on, the more intricate and difficult does the subject become, and naturally so, because we find such a large per cent. of our cases which suffer from contagious diseases, so environed as to make the difficulties and obstacles which we find in our pathway to successful scientific treatment quite insurmountable.

The first obstacle, as a rule, with which we have to contend, is an uneducated and selfish laity. How often is it the case that we find it practically impossible to impress those having charge of contagious cases with the importance of isolation and disinfection. I am of the opinion that proper isolation and disinfection can never be successfully done in private practice until the laity is properly educated upon this point. To set out to accomplish this, I am convinced, is not only our first and imperative duty, but a herculean task. You will doubtless say, "Yes, that is all

so, but how shall we ever be able to accomplish such a desirable result?" My answer is, by precept, by example, and by law; and, I assure you, the last must not be the least.

How often is it the case that the physician on visiting a case finds the following condition of things to exist: A family composed of father, mother and four small children, in a tenement house, with but four rooms, parlor, kitchen and two bedrooms, at their disposal. Father at work, one child has diphtheria, the baby is still at the breast; the physician is informed that they are not able to employ a nurse, or even such assistance as would enable them to isolate the sick, and under no condition would they think of permitting their child to be taken from home to a hospital for contagious diseases, in the absence of a law compelling it to be done. Here is an environment, here is a picture, which, I am sure, is familiar to you all, and one which presents to the physician in charge such absolutely insurmountable difficulties that his heart fails him at once, and he says, "I can only do the best I can," and what can he do; with the mother as nurse to the sick child, and nurse to the baby, cook, chambermaid, and last, but not least, disseminator of disease and death throughout the house and district in which she lives?

The difficulties in the way of isolation and disinfection here are so great, that the doctor only makes a faint effort at pretending to introduce, much less enforce, any such thing.

This should not be, and if the poor mother could be made to appreciate the fact that she is likely carrying around the house a concealed dagger, with which she is putting to death one after the other of her loved ones, things might be vastly improved upon.

We should not only advise, but insist on complete isolation. Parents have no more right to expose their own children to the contagion of disease, than they have to expose those of others to it, and I am sure there are none who would permit another to enter their home and mingle with their children under such circumstances, if they knew it.

The next most formidable obstacle which city physicians find in their way to isolation is the overcrowding in tenement houses and private families of large proportions, who are, by reason of poverty, forced to occupy small and unsanitary dwellings; it is here that the physician finds himself completely handicapped.

It may sound very strange to our rural members to hear that in cities especially, as Dr. Huntington, says, we have unfortunately to deal with a civilization which overtasks and underpays wage-workers in order to add superfluous affluence and irresponsible power to the estates of the few; a civilization which helps a hundredth part of the population to own half of the property; a civilization which exposes innumerable women and children to

moral ruin for a living, which drives pale, emaciated and rickety children daily from pestilential tenements to factories and stores; a civilization which countenances an owner of real estate who has pocketed millions of dollars by the rental of a dozen or more nests of misery and dens of vice, five or six stories high; a civilization which lets thousands of children die within a year after they are born, in these cellars, garrets, without uttering a sound of indignation or regret; which robs the individual of his or her independence, enslaving them, by fear of want, to landlord and employer; this, truly, is not a civilization for any conscientious and well-thinking people to be proud of.

Dr. Homan, of Missouri, in speaking of overcrowding in cities, says that one of the conditions incident to it is a very high birth rate; this he attributes to an effort on the part of nature to meet the enormous waste of life, so that a margin may remain to prevent complete extinction, but he protests that the vital and moral quality of offspring thus produced gravely endangers society.

We all know that in cities, tenement districts are known to the police officials as nurseries of crime, and are known to the sanitary authorities as breeding places of disease, and it has time and again been demonstrated that over-crowded tenements are foci of epidemic-contagious diseases, which when once started, cannot be stamped out until they have spread from poor to rich, and from district to district.

Thus it will be seen that natural laws cannot be successfully violated; if the rich and selfish oppress the poor and ignorant, they will surely have their reward, for, if in no other way, they will be rewarded by a visitation of contagious disease directly traceable to the sources above named, and from which they and a whole community cannot escape.

Hence it is a question of vital importance, not only to the medical profession, but one which should actively interest the whole community. The laws now on the statute books bearing upon this question, in my judgment, are lamentably deficient, in that they deal only with the patient and his environment, and absolutely fail to apply to those who would and do make such environment possible.

You may build contagious disease hospitals; you may appoint sanitary officers—both of which are highly commendable things to do—but you will never stamp out contagious diseases until some law is passed by which men are restrained from building new or converting old, dilapidated buildings into tenement houses, into which men, women and children are crowded *ad libitum et ad infinitum*, without the least restriction or requirement.

Men, who for the sake of the almighty dollar, feel called upon to dot the city over with these dens of vice and incubators of disease should be made to know that they would be held strictly to account for the results of their labor.

My opinion is that if the people fully appreciated the importance of this question, popular sentiment would be so strong against it, that it would take a brave man indeed who would undertake to locate one in any community, whether the inhabitants thereof be rich or poor. Here, then, is the field for practical work on the part of the profession in teaching the rich, poor and ignorant as to their duty in the premises.

If it is proposed to locate a contagious disease hospital, or a hospital for any purpose, in any part of the city, people for squares around will set up a hue and cry as if a wolf were at their very door, although they were equipped with all the latest improvements and manned by the most intelligent physicians and trained nurses.

Yet some irresponsible individual will locate a tenement house in some alley or lane, at the very back gate of some of these people, which would be a thousand times more dangerous, and not one word of complaint is heard from them or those in the immediate vicinity. To what is this due? The only answer is, ignorance.

If the people could be educated up to a point where they could fully appreciate the danger of these pest-houses, their attitude toward them would be different, and I doubt whether one could exist in any community.

I would advise the enactment by the proper authorities of a Public Health Law, as follows: The first section of the act should regulate and prescribe the conditions upon which a permit could be issued for the erection or remodeling of any building which is to be used as a tenement, and the work should be done under the supervision of the health officer and the corporation's engineer and building inspector.

Another section should give the health officer absolute power to prevent the overcrowding in small and badly constructed houses located in either street, lane or alley—a condition so prevalent in this city to-day and one which is so fruitful of disease.

Another section should absolutely proscribe, under heavy penalties, the dens of misery, shame and death, known as infant boarding-houses, so common in the lanes and alleys of the cities of our State, where infants are taken with the hope, if not almost the tacit understanding, that they are to be starved to death. This section should also make it a crime punishable by heavy fines and imprisonment, for the health officers to permit such houses to continue to exist, or the owners to rent or permit their houses to be used for such purposes, the infants in such

cases being, for the most part, the offspring of working women and servant girls who pay paltry sums from their meager salaries for their support.

Another section, in addition to the law existing, which requires physicians to report their existence of contagious diseases, should be enacted, whereby the parent, guardian or those in charge of the premises upon which contagious diseases exist, should be required, under penalty, to report promptly to the health officer the termination of the disease; upon the reception of such notice the health officer should be required to see that the house, or any part thereof which, in his judgment, needs the same, should be properly and thoroughly cleansed and disinfected, and any articles therein contained should be subjected to the process of cleansing and disinfection, or complete destruction. This I consider one of the most important steps in the management and control of contagious diseases. It should, therefore, be done thoroughly and under the direct supervision of a competent physician.

I would therefore urge upon the authorities the importance of having the all-important and responsible positions of sanitary inspectors filled by physicians. It is not only unreasonable, but preposterous, to expect men who know nothing of bacteriology, or the effect of germs upon the system, to scientifically and successfully fill these important positions.

The present method of disinfecting is entirely too crude and commonplace. My opinion is that to properly and thoroughly disinfect a room, all paper should be scraped from the walls, if papered, and carefully burned; if not, the walls should be scraped and afterward two coats of whitewash should be applied; the floor, washboards, doors, door frames, windows and window frames should be thoroughly scrubbed with water and concentrated lye, after which a coat of paint or varnish should be applied; all articles of furniture should be painted or varnished, and all bed clothing, beds and other articles in the room should be subjected to sterilization by steam.

The law should also provide for an infectious disease hospital; and I would say in passing that it is a burning shame that the earnest appeals of our faithful and efficient Health Commissioner for such a hospital have been so long disregarded by our municipal legislators. It should also provide a suitable ambulance by which infectious persons could be transmitted to the hospital.

The law should be so framed that the authorities would have power, with the advice and consent of the family physician, and where it was clearly shown that the isolation and disinfection were impossible at home and danger of contamination great, to remove such cases to the hospital, where, if they so desired, the family physician could follow and continue in attendance upon

the patient. This provision of the law, I think, would tend to greatly lessen opposition to it on the part of parent and physician.

In houses where such diseases have existed, and the people moving out soon after the convalescence of the patient, the owner or agent should be restrained from renting the premises again until he has obtained a certificate from the authorities showing that the house had been properly disinfected and cleansed.

No auctioneer should be allowed to sell second-hand bedding or bedclothes without the owner showing a certificate of the health authorities to the effect that no contagious disease had existed in the house from which they came.

It should also be a misdemeanor, punishable by fine and imprisonment, for any owner to sell bedding, bed-clothes, carpets, or any article of clothing to any second-hand dealer or other person, he knowing them to be from a house in which contagious disease did at the time or had recently existed.

It should likewise be a misdemeanor for any person to buy or expose any second-hand article of clothing for sale, without first obtaining a certificate from the health authorities as to their sanitary condition.

As there is to be a paper read before you on School Hygiene, I will not discuss that subject here.

MEDICAL INSPECTION OF SCHOOLS FOR THE PREVENTION OF DIPHTHERIA.

By Delano Ames, A. B., M. D.

The subject allotted to me for presentation this evening is one with which I feel sure you are all more or less familiar and concerning which each one has probably already formed his own opinion. I must therefore ask your indulgence if, in the following discussion, I refer to facts that have already been stated, and go over again the fundamental principles in a somewhat elementary manner, calling your attention to work on the prevention of disease in general before taking up the more special subject before us of the sanitary inspection of schools, with reference to the prevention of diphtheria.

While there are certain broad principles and general rules applicable to the sanitary control of all infectious diseases, of which every physician is supposed to be thoroughly cognizant, there are a few special points which relate to each disease in particular, and it is to these as they relate to the hygienic management of this most dreaded disease of childhood and early

adult life, diphtheria, that I wish to particularly call your attention this evening. A knowledge of these facts should not be the possession of physician alone, but should be shared by those who daily come in contact with children in the class room.

It is hardly necessary to refer to the prime importance of a thorough knowledge of the etiology of diphtheria, of its modes of dissemination and of the circumstances which tend to favor or to hinder its transmission. These facts should be well understood, especially by those upon whom rests the responsibility of looking after the health of the school children of any community, and the demonstrations and remarks already made have dealt with this important side of the subject.

The mass of recent work in the field of experimental and preventive medicine has been rewarded by results beyond the expectation of the most sanguine, and it is only necessary to point to the changes that have been brought about in the case of such diseases as typhoid fever, diphtheria, cholera, tetanus and others of the same general nature, and to note the further fact that in many the direct result has been, as is particularly well illustrated by diphtheria, a decided reduction of the death rate, to realize that we are on the threshhold of an era in the history of medicine which holds out promises of being glorious in its achievements beyond the conception of the human mind. So marvelous has already been the foreshadow of its possibilities that one naturally hesitates before venturing to prophesy the condition of affairs which will confront us at the full noon-tide of this day.

At the foundation of all the advancement already made there rests one great fundamental principle, and it is to the promulgation of the doctrine that it embodies that we owe our present progress, and by its still further enforcement we may with perfect reason hope to achieve much greater results. I refer to the doctrine that the majority of contagious and infectious diseases that we have to deal with to-day have their origin in filth, and that when we come to that happy condition when dirt and pollution shall be things of the past, we will no longer feel the necessity of combating diseases whose origin lies in unsanitary conditions.

If time permitted I should like to briefly sketch the history of a few of those diseases with which we are most familiar, and show you how it has been definitely proven that they arose from masses of accumulated human refuse material at a time when cleanliness was largely at a discount. The history of such epidemics as the Great Plague of London, or the Black Death, the various visitations of cholera, or the more recent Bubonic Plague which is responsible for the loss of thousands upon thousands of human lives, forms a chapter which points a moral that none should fail to heed.

While we have learned much concerning the nature of the different bacterial diseases, the life history of thè various pathogenic micro-organisms, the nature of their toxines and of the antitoxic substances with which their progress is combated, at the foundation of it all rests the important fact that many of the diseases in question, now known to be due to micro-organisms, and about which we are daily learning so many and such important facts, have their origin in human refuse, are in reality the direct outcome of habits of carelessness and uncleanliness; which fact having been thoroughly established, leaves but one conclusion to be drawn, namely, that in order to live in freedom from these diseases we must live under better sanitary conditions. Following the hint thus given it has been found that where cleanliness has taken the place of filth, disease has steadily diminished. The term cleanliness is of course here used in its broadest sense, meaning both the cleanliness of the person, of the habitation, clothing, air, food, drink, and, in fact, of all our surroundings.

One by one diseases have been shown to be due to micro-organisms that have found their way into the economy either through the alimentary tract, the respiratory tract, or through the ruptured surface covering of the body. The specific organisms of the various diseases have been proven to exist either in the air we breathe, or in the food, or drink of which we partake, and it has further been demonstrated beyond a peradventure, that these find their way into these necessities of life, air, food, drink, etc., because of careless habits. Take, for example, either the case of typhoid fever, or of tuberculosis. In the former, water supplies are contaminated by human refuse material, as has been clearly proven over and over again, and being taken into the system leads to the development, in a certain number of cases, of that disease which the specific micro-organism is capable of producing. In the case of tuberculosis the air we breathe becomes contaminated again by human carelessnes and habits which, to say the least, are disgusting. Sputum-laden air breathed by healthy individuals results in a certain proportion of cases in pulmonary tuberculosis.

The lesson which the demonstration of these facts teaches, if taken to heart will in the end lead to the reduction in the number of cases of typhoid fever and tuberculosis to the minimum. In fact, the knowlege of the filth origin of communicable diseases has already led to a reduction in the number of cases of many of them and a consequent decrease in the number of deaths from the same, and this good result is in very large measure attributable to the faithful work of municipal boards of health in promulgating the doctrine of the filth origin of disease and in attempting to better the sanitary conditions of large and small communities.

Willoughby[1] states in an article written for the *American Journal of Medical Sciences* some time ago, that the falling off of infections diseases in England, in the past few years has been directly attributable to a general improved condition as regards water supplies, sewarage, drainage, ventilation and the like, which has been brought about by the enactment and enforcement of municipal regulations bearing upon these subjects and that such diseases as typhoid fever, diarrhoea and dysentery, phthisis, scarlet fever and the like, have shown a distinct diminution. In the same article he also mentions the fact that diphtheria does not seem to have shared with the others in this decrease, but that it has either seemed to stand still, or to have increased somewhat.

In attempeing to explain this fact he notes that, although there were statutes to prevent the spread of the disease, its continuance was probably to be attributed to the massing of the children in the public, parochial and private schools.

Following this idea, Mr. S. T. Murphy, Health Officer to the London County Council, instituted a series of investigations to determine whether or not the number of cases of diphtheria reported fell off during the period of vacation, in children between the ages of 5 to 15 in a larger proportion than it did in children under and over this age, this being considered the age at which the greatest number of children attended school, and conversely, to see whether, after the reassembling of the children for another school term, the proportion of reported cases in this age-period increased in a larger proportion than did the others. The results that he obtained are of considerable interest, as they demonstrate conclusively the fact that the school plays an important part in the propagation of this justly dreaded disease.

Murphy collected all the cases reported to the Health Office and divided them into three classes, the first included all children under the age of five, the second all between five and fifteen, and the third all over the age of fifteen. He then further tabulated these according to whether they were reported in one of the following periods:

Period I. Four weeks of the school term preceding vacation.

Period II. Four weeks of vacation, beginning a week after the schools closed.

Period III. Four weeks, beginning one week after the reassembling of the children for the second term.

I append the tables herewith :

	(UNDER 5)	(5 TO 15)	(OVER 15)
Percentage of the number of cases in Period II, in relation to that of Period I.	+20	(1892) —3	—10
	—8	(1893) —27	+1

Percentage of the number of cases in Period III, in relation to that of Period II.	—7	(1892) +29	+34
	+6	(1893) +81	+33

While the results for 1892 were sufficient to indicate the accuracy of Dr. Willoughby's conclusions, those of 1893 were much more conclusive.

The result of these statistics showed, as appears from the tables, that during the second or middle period, when the children were scattered for their vacation, the number of cases of diphtheria reported to the health authorities fell off considerably, and in a much larger proportion between the ages of five to fifteen than either for younger or older children, and that during the third period, or after the schools had reconvened, the proportion of cases reported between these ages increased out of proportion to the increase in the other age periods.

The part played, therefore, by the school in the propagation of diphtheria seems to be fairly well established by these studies, and though I know of no similar piece of work in this country, (time has not permitted me to make a careful search for the same,) I do not doubt but that Dr. Willoughby's results could be confirmed here.

Such being the facts in the case, it becomes of grave importance for those upon whom rests the responsibility of watching over the health of the community to institute such reforms as will tend to reduce the danger from this source to the minimum.

That the importance of this subject has been fully realized by certain of our large boards of health is evidenced by the fact that they have recently taken up the matter and are endeavoring to institute such rigid sanitary supervision of schools as has yielded most valuable results in Paris, London, Boston and some other large cities. Within a very recent date the sum of $45,000 has been appropriated for the Board of Health of New York City with which to institute a more thorough sanitary oversight of the public, private and parochial schools of that city, not only with reference to the checking of the spread of diphtheria, but of all contagious diseases. It is proposed to appoint a number of sanitary inspectors who, I believe, are to be physicians familiar with the clinical history of contagious diseases and with diseases of the eye. To each one of these inspectors a single school will be allotted, and it will be his duty to visit the same every day, inspect the general sanitary conditions, as regards ventilation, sunlight, sewerage, etc., and to receive from the teacher a list of the

absentees, and of children apparently not well. It shall further be his duty to investigate every case that in any way appears suspicious, and to report the same to the chief sanitary inspector. Upon the certificate of this visiting physician only, a child away from school because of contagious disease, either in his own person, or in that of some member of his family, can be readmitted. Each inspector is therefore personally responsible for the condition of the school under his care. It is hoped by this method and by enforcing all such sanitary measures as are possible, to further reduce the death rate from contagious diseases five per cent.

With respect to certain specific recommendations, Dr. Henry Dwight Chapin makes the following, among others:

1. That the air space in schools per scholar shall be greater than it now is, for it is found in many schools that the cubic feet of air per scholar is below that required by law for tenement house occupants.

2. That the arrangement of the wardrobes, which he now considers a source of danger, shall be made more sanitary.

3. That the use of the slate, with its accompanying slate pencil and sponge, be abolished. That pencils and pen holders be not transferred without disinfection.

4. That all articles belonging to children attacked with any contagious disease be destroyed.

5. That books taken home be covered once a month at least with heavy brown paper.

6. That the common drinking cup be abolished, and that a pitcher of pure water be supplied, which shall be filled at least twice a day.

7. That the banisters and other articles of furniture be frequently cleaned with some antiseptic preparation.

To these it seems to me, that certain other recommendations, especially referred to ventilation, the admission of sunlight and the cleaning of the floors, walls, etc., might with benefit be added.

To return again to the subject of diphtheria, there are certain facts that are of the highest interest to us as physicians and health officers, and of the greatest importance as well, with which we should all be familiar.

There has recently been reported an epidemic of diphtheria in a small village near Tarrytown-on-Hudson. In consequence of this the local health board has ordered all schools closed and church services discontinued. The disease is supposed to have been spread by a child who attended school in the early stages of diphtheria, the true nature of the disease not having been recognized.

I have cited this instance as illustrative of the necessity of prohibiting any child attending school who suffers from any form

of throat trouble about which there is the slightest doubt in the mind of the attending physician, until a bacteriological examination by a competent bacteriologist shall have proven the disease to be non-contagious, and to emphasize the necessity of bringing within easy reach of every physician the means of procuring a bacteriological examination of all cases of suspected throat disease.

In this connection can not be too highly praised the efforts of the boards of this and other cities, to establish stations throughout the city where culture tubes can be prepared for inoculation, and from which each day the tubes left are collected to be examined and reported on at as early a date as possible, and the further efforts of the board to instruct physicians in the simple technique of culture tube inoculation.

Still another fact in reference to the subject before us is of decisive importance. How soon after a child has recovered from diphtheria is it safe to allow him to mingle with his school-mates? The answer to this question brings out a mass of work leading to very interesting and important results. Sevestre and Medy,[2] working on this problem, studied the condition of the throat, after recovery, in two series of cases, one of which had been treated with local applications, and the other by the antitoxine method. In the first series in about one-half of the cases it was found that the bacillus disappeared with the disappearance of the membrane, and where they still existed has ceased to be virulent. In the remaining 50 per cent. the bacillus of Loeffler continued for some time after the subsidence of the disease. In four cases virulent organisms were found from six to fifteen days after the membrane had disappeared. In two cases cultures from throats were negative, while those from the nose developed virulent organisms. In one case the Loeffler bacillus was obtained in virulent condition for forty-nine days after removal of the tracheotomy tube and thirty-eight after the patient had left the hospital. In the second series there were in all ten cases treated by the antitoxine method. In three cases virulent cultures were obtained for a varying time after recovery; and in one case, twelve days after, a similar result was obtained.

In this connection the facts given by Dr. Welch,[3] in an article published in the *American Journal of the Medical Sciences*, are of interest. Referring to the work done by Park upon the length of time that virulent diphtheria bacilli could be obtained from the throats of children cured of the disease, he gives the following figures:

In 752 cases examined, the bacillus was found to have disappeared from the throat within three days after complete disappearance of the exudate in 325 cases. In 427 cases the organism lasted a varying length of time, as follows: 5 to 6 days in 201

cases; 12 days in 84 cases; 15 days in 69 cases; 21 days in 57 cases; 28 days in 11 cases; 33 days in 5 cases; 63 days in 2 cases. In an extra case reported by Park, the organism was obtained in virulent culture forty-nine days after recovery. Park has also reported a series of fourteen cases in which the diphtheria bacillus was recovered in an undiminished intensity of virulence at intervals varying from ten to forty-four days.

While persons well of the disease and in whose throats or nasal passages the organisms still exist in all their vigor are not apparently so liable to spread the disease as those suffering with an acute attack, they may convey it in all its deadliness, and that after the lapse of an exceptionally long time, as is illustrated by a case that I will cite in a few moments. The explanation of this fact would seem to be, according to Dr. Welch, in the further fact that the organisms are present in the throats of recovered individuals in much smaller numbers.

A further point of considerable practical importance is the fact, as proven by Park, and by the work of Sevestre and Medy, previously mentioned, that irrigation and mopping of the throat with antiseptic solutions, though it will cause a disappearance of the organisms in from one-half to two-thirds of the cases in from one to three days, leaves the virulent microbe in the throats of the remaining one-third for from one to three weeks.

As bearing on the subject under discussion from still another point of view it has been found by Park that Loeffler bacillus can be recovered in a virulent condition from the throats of 50 per cent. of healthy people who have been more or less exposed to the disease. (These figures are from statistics made in the tenement districts. In better localities it is about 10 per cent.) The practical application of this fact is obvious, since in many instances school childreen attacked with diphtheria have to be housed with unattacked brothers and sisters, likewise school children, who may not contract the disease, and the question will arise, at what time may these children, who have escaped the disease, be readmitted to the school. In all such cases the answer should depend on the results of a carefully conducted bacteriological examination of the throat, made with the same care as though the child had recovered from the disease.

In discussing this problem, Park[4] says: "All members of an infected household should be regarded with suspicion, and in those cases where isolation is not enforced, the healthy as well as the sick should be prevented from mingling with others until cultures, or sufficient lapse of time, give presumption that they are not carriers of contagion."

As illustrative of the danger that may exist from a person long well of diphtheria, I call your attention to an interesting case reported by Belfonti,[5] in *Riforma Medica*, for March 23, 1894.

A fatal case of diphtheria in a little girl came under his observation. From the throat of the case cultures of the Loeffler bacillus and of a streptococcus were obtained. The interest in the case lies in the fact that the infection seems to have been traced to a brother who survived an attack of the disease seven months before. An examination of the brother's throat after the death of the sister showed chronic follicular tonsolitis, with indolent enlargement of the cervical glands. The exudate from the tonsils showed the presence of the same organisms, recovered from the throat of the case that had proved fatal. An extremely virulent culture of the Loeffler bacillus was obtained. Three months later a second examination showed the same thing, but the diphtheria bacillus was much attenuated and gave rise only to slight local inflammation. Immunity in the case of the brother had been obtained by his previous attack.

Before bringing the subject to a close, but one further point of practical importance need be brought out, and that is the possibility of the diphtheria bacillus being present in other localities than the throat or nasal passages, and especially outside the body on articles of clothing, book, the hair and the like. Without going into the work that has been done on this subject, it is only necessary to state that articles exposed in the room occupied by a diphtheria patient have been repeatedly subjected to rigid examination, with the result that in very many instances the organism has been recovered in undiminished intensity of virulence from such articles as the hair, furniture, books, pictures, etc. The practical bearing of these observations is sufficiently apparent to need no further comment.

Facts such as the ones that I have endeavored to bring out in the foregoing pages emphasize very strongly the importance of the following conclusions:

1. That every case of sore throat in a child attending school should be looked upon as suspicious and treated as contagious until proved to the contrary either by a bacteriological examination, or by the lapse of sufficient time.

2. That a child attacked with diphtheria should be immediately sent from school and isolated.

3. That the school belongings, books, etc., of the child so attacked should be destroyed.

4. That other children in the same family, or children exposed in an any way to the contagion of diphtheria, should be kept from school and from mingling with other children.

5. That after recovery a repeated bacteriological examination should be made of the throat and nasal passage and the child not allowed to return to school until the disappearance of the Loeffler bacillus is clearly shown.

6. That other children in the same family, or children in any way exposed to the contagion of the disease, should be treated in exactly the same way and not allowed to return to school until the bacteriological examination of the throat is negative.

7. That all the belongings of the sick one, books, etc., that have been exposed in the sick-room should be thoroughly disinfected, or destroyed, and the child's hair as well as its body should be rendered as nearly germ free as possible before a return to school is permitted.

8. And that finally there should be a sanitary inspector for every school, who should be a physician and who should see to it that the above recommendations are carried out, and who further should either be able to make the necessary bacteriological examinations, or have them made by the properly authorized representive of the local board of health.

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4. Park, W. H.—The Medical Record, July 30, August 6, 1892; and February 11, 1893.
5. Belfonti.—Riforma Medica, March 23, 1894.
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MINUTES OF THE SECOND DAY'S SESSION.

THURSDAY, FEBRUARY 18TH, 1897.

The meeting was called to order at 11.15 A. M., by Dr. Schaeffer, who said:

The three fundamental notes of success that have been sounded by the speakers are, first, education; second, legislation; and third, execution. We have been presided over by the Chief Executive of the State, by the majesty of the law, and I now have the honor of presenting the representative of education, Dr. Daniel C. Gilman, President of the Johns Hopkins University.

DR. D. C. GILMAN: I esteem it a very great distinction to be asked to preside over the deliberations of such a body as this that meets to consider the best interests of the State of Maryland. I do not propose to detain you by any long address, but if you will allow me two or three words I will merely express in behalf of those who represent the educational institutions, their gratification at being associated with the men who are engaged in applying knowledge to the promotion of the health of the State in which our lives are cast. What is life worth without health? Our hopes and aims, our pursuit of happiness, knowledge, property, all vanish with the loss of health. You gentlemen representing the science of medicine, the calling of teachers, and the application of law, are capable of bringing about a revolution, and I thank you for the call to be here and take part in this most hopeful conference. I have seen no meeting in Maryland in twenty years more full of hope and promise. Before beginning the regular order of business, Dr. Fulton desires to read two letters.

Dr. Fulton then read a letter from the burgess of New Windsor, enclosing two ordinances passed for the regulation of slaughter houses and pig pens, and describing the hostility which they had aroused. A letter was read from a physician in Montgomery county, who sent a drop of dried blood upon a slide, and asked if it was the blood of a typhoid patient.

DR. FULTON said: "The first letter is so resolute in tone, and the ordinances are so well conceived, that I think the burgesses of New Windsor deserve from this conference some expression of sympathy and encouragement. The second letter, asking for the application of the Vidal test to this drop of blood is a request of a sort which weighs heavily on the State Health

Officer. We ought to do these things for every member of the profession who asks it, and I hope the day is near at hand when the State will enable us to do so. The arrival of this note is opportune, and I shall hand the slide to Doctor Livengood, asking him to make it a part of his demonstration this morning, and let us all know what we are to say in answer to Dr. Eversfield's inquiry.

In the absence of Dr. Flexner, the demonstration of Typhoid Fever was given by Doctor Livengood.

DEMONSTRATION OF THE PATHOLOGY AND BACTERIOLOGY OF TYPHOID FEVER.

By Louis E. Livengood, M. D., Baltimore, Md.

Dr. Flexner, being unable to attend this session, asked me to present this subject and I hope you will pardon me for appearing so unprepared. These specimens are to show the lesions of typhoid fever and the cause of the disease. Typhoid fever is recognized as a disease which is constantly associated with the presence of the typhoid organism. These organisms have seats of preference and usually these parts of the body are most distinctly diseased. It is especially localized in the intestine and particularly those parts that represent lymph structures. The lymph structures in the intestine, as most of you know, consists of small nodules grouped together in patches known as Peyer's, and some single ones scattered about in the same region. Besides this localization we have the other lymph tissue in the body also involved.

First let us consider the lesion in the intestine. The first condition that is noted is the swelling of the lymph nodules of the intestines and increase in the elements of the parts. There is an increase in the number of cells and this hypertrophy shuts off the blood supply of these glands. This causes an anemia of the parts and destruction of the cells. They become, as we say, necrotic and are thrown off, leaving in their place depressions more or less deep, sometimes simply taking in the inner layer of the mucosa, sometimes taking in more tissue, and sometimes going into or even through the muscular layer. We can divide this condition very well into stages. First, swelling; second, necrosis, on account of anemia; and thirdly, a sloughing off of these necrosed parts, leaving a distinct ulcer, which may go on to complete perforation, or to the formation of scar tissue, by the proliferation of cells, which finally form a smooth scar. The last stage cannot occur if the ulcer is so deep as to perforate the

tissues. If, in the course of this perforation we have a large blood vessel involved, or even a small one, with subsequent breaking of its continuity, we then have a hemorrhage. This may lead to a fatal issue. The fourth condition, scar formation, therefore occurs only in those cases that recover.

These specimens represent very clearly the first two stages combined, and in these three specimens the last stages are shown. In the first you see the Peyer's patch very much enlarged and swollen, and the glands around about it are also in the same condition. Here the patches have become necrotic, and part of it shows the slough still on the surface. In the second specimen we have the same thing, probably slightly more advanced where we have the necrosis and sloughing of the lymph elements. In the last specimen we have the condition of complete necrosis with ulcer formation. You will notice that the floor of the ulcer is smooth, and you can see the striae of the muscle. In the lower ulcer you notice a distinct perforation. I unfortunately cannot bring the fourth stage, that of cicatrization, before you.

These must be recognized as the definite lesions of typhoid fever, and very rarely do we have a typhoid fever without them; in fact, a typhoid fever without them may be doubted. We have still other lesions than these. The lymph glands about the intestines and the lymph tissue throughout the body seem to take on the changes, perhaps on account of the poison circulating in the blood. The spleen becomes very large and soft, and almost fluctuating at times. The liver shows no distinct leisons except that of cloudy swelling, although there has been noted proliferation of lymph tissue in the liver. The other organs show no changes.

As to the causation of this disease, while the three postulates of Koch have not been proven, namely, to find the organism, to cultivate it, and, by inoculation to produce the disease, there seems to be no doubt that this organism is the cause of the disease. The failure of the attempt to produce the disease by feeding the animals, or by injection into the lower bowels, is accounted for by saying that no similar disease is known to exist in the lower animals. This organism was first described by Eberth in 1886, but since that time it has been cultivated in all the laboratories of the world. It consists of a bacillus or rod-shaped microbe, very hard to demonstrate, of a size probably not more than one-fifth that of the red corpuscle, and it stains very deeply and uniformly with all our stains. It is a motile organism, its motility being due to flagella, which by their movements cause the organism to go at a headlong gait. It moves across the field of the microscope, as you will see, with a peculiar tumbling motion.

The ordinary methods of diagnosis have become very much confused. The great group of colon organisms are present in the intestine and resemble the typhoid bacillus to a great extent. Some are motile, they stain intensely, they do not produce spores, they grow on the same culture media and even in the same way that the typhoid organism does. For instance, on milk the colon bacillus acidifies milk in twenty-four or more hours. The typhoid bacillus may do that, but usually does not. The difficulty in diagnosis is (and that is the point I wish to bring out) that the organism may act contrary to the way we expect and not according to the manner in which it was first spoken of. On potato they both grow alike, though the typhoid is not so abundant. The growth of the typhoid bacillus on gelatine was at first thought to be distinct, but so many organisms grow in the same way that now we will not stop to describe that growth.

There is nothing, then, that we could claim to be distinctive of typhoid fever. This has led to experiments to determine some kind of medium upon which the typhoid bacillus would grow in a specific manner, and there are some 365 mediums upon which it can be recognized. These have all given away, however, to one or two, the most prominent of which is that of Elsner. From the myriads of organisms in the intestines he is able to separate out all except the typhoid and colon bacilli by means of potassium iodide, and then by means of a culture on potato, he can distinguish between these two. This is a step in advance, but that which is driving all others out is that which was originated by Pfeiffer. He found that by inoculating animals you could get immunity, and that the blood serum of these animals had a peculiar effect upon the organisms. Blood from a patient who had typhoid fever possessed the same power. If these organisms be treated with this blood, they gradually come together in little groups, and soon disintegrate in the form of small granules, which he called its bactericidal properties. This method was not used until ten years after its discovery. This observation of Pfeiffer was a very valuable one. Since that time Vidal has done some important work in this line, but the method used to-day is very much modified, and was first brought out by Wyatt Johnson, of Montreal.

A drop of blood is taken from the ear or finger and sent to the laboratory, and all they need is a pure culture of the microorganism and the microscope. This blood, if dry, is rubbed up with a little sterile water simply to make it fluid. It is added to one drop of typhoid culture, and as a matter of practice we generally use culture of the bacillus coli communis as well, to control the test. These two cultures are placed drop by drop on different slides. They are both put under the microscope and the alteration occurs

almost immediately, though it varies with different blood. You notice at once a slowing down of the organism and its peculiar grouping. There is some attraction of the organism to the group, for they may wander away, but come back again to be subsequently joined to the group which is nearest. With the colon bacillus this does not occur. It has been proven that within four to six days after infection has taken place this reaction will take place in a characteristic manner.

Sometimes you will not get the reaction for from one-half to one hour. Usually they take, as a working proposition, one hour as a limit. If it does not occur, then they make another test. Dr. Wyatt Johnson had sent to him in Buffalo a number of blood slides marked with a number which he did not know. He was then asked to make the diagnosis. He examined them and at the end of an hour brought in a diagnosis of typhoid in three cases, which subsequently proved to have had it, and no reaction in one, which was later shown to have Bright's disease. This was done at the very first meeting in which he brought this method forward. I will be glad to demonstrate this reaction with the blood which Dr. Fulton has just handed me, and also with some which I have brought from the laboratory.

THE BACTERIOLOGICAL EXAMINATION OF WATER

By Wm. Royal Stokes, M. D.

Another series of examinations are conducted in municipal laboratories which are directed towards the study of the water supply. Inspection of the various water sources is often of great value, for carefully trained inspectors can often discover nuisances directly contaminating a source of supply, and demand their removal. The chemical examination of water also forms a ready method of detecting the presence of organic pollutions, and the products of bacteria.

The bacteriological investigation of waters is also of great importance. Drinking waters have at times been found to contain such pathogenic or disease-producing bacteria, as the bacillus of anthrax and typhoid fever: and during epidemics of Asiatic cholera, the germ of this disease has frequently been found in the water supply. These organisms are generally deposited in the water with human intestinal discharges. If, therefore, we are able to obtain an exact knowledge of the bacterial condition of any water, by means of our tests, we obtain data upon which to devise means by which the supply may be rendered purer.

The bacteriological examination of water consists in three distinct series of examinations.

First. A careful classification of the various microscopic animalculae and plants present in the microscopic sediment. This is of value in determining the origin of various unpleasant tastes and odors, or surface contamination of deep wells.

Second. The numerical estimation of the number of bacteria present in one cubic centimeter of water.

There is generally a difference between the bacterial contents of deep wells, and surface or river waters. Artesian wells are often free from bacteria, and pure water from ordinary deep wells should not contain as a rule more than 100 to 200 bacteria to the cubic centimeter. Stagnant or polluted well or spring water often may contain several thousand bacteria in one cubic centimeter.

It would be a difficult matter to establish any arbitrary standard for the bacterial contents of rivers, since the number of germs present is influenced by such varying conditions as the rainfall, temperature, the exposure to light, the depth of the water, its aeration, and the quantity of organic matter and mineral salts which the water contains.

Many large rivers, however, only contain from 500 to 1000 bacteria per cubic centimeter above the site of large towns, while below such places, the same water which has received the waste from factories, sewers, stables and household drains, may be found to contain from 15,000 to as high as 100,000 germs to the cubic centimeter. These are generally harmless to human beings, as most of the water bacteria perish at the temperature of the human body. Averages taken from numerous observations of this character are ofter useful in determining the probable presence of pollution from one or all of the sources above named.

The method simply consists in adding one centimeter of the water to be examined to a tube of melted sterile gelatine by means of a graduated glass tube, and then pouring the fluid into a sterile Petri dish. The gelatine becomes solid at the room temperature, and in several days the bacteria appear on the surface as small elevated collections called colonies. These can easily be counted by means of the Lafar colony counter. If the colonies are too numerous, the water can be diluted before adding to the gelatine.

It has been already mentioned that many disease-producing germs find their way into the water from the intestinal deposits of men, or animals. The fecal discharges of men and animals constantly contain a germ known as the bacillus coli communis, or colon bacillus. This can always be recognized, if present, by means of a series of simple tests, which depend upon the fact that this organism causes in a characteristic manner, the fermentation of the various sugars when dissolved in nutrient bouillon.

Theobald Smith has studied this fermentation and gas production in the fermentation tube, and has found that water containing the colon bacillus will always carry out the same definite formula, even in the presence of the other fermentative bacteria of water. He finds that about fifty per cent. of gas forms in the stem of the fermentation tube containing a two per cent. solution of glucose, or grape sugar, after exposure to a temperature of 35° C. for three days. The gas always consists of one part of carbon-dioxide to two parts of hydrogen and the medium always gives an acid reaction. The same may be said of lactose or milk sugar. Saccharose, or cane sugar, is either not fermented at all, or the same proportion and amount of gas forms very slowly, not reaching its maximum quantity for two weeks. Many other bacteria have been similarly tested, but the fermentation formula never resembles that of the colon bacillus.

We are, therefore, in possession of a fairly exact method of detecting the presence of intestinal contamination, and although the colon bacillus may occasionally be present in pure drinking water, yet its detection in quantities as small as from 0.1 to 0.5 of one cubic centimeter of water should lead to a careful inspection of the water source. Waters free from such bacteria can always be obtained, and it is certainly more pleasant to use such a fluid than one which may at any time contain bacteria capable of producing disease.

The use of large sand-bed filters has lately been applied to filtering the water supplies of large towns or cities with remarkable success. The water flows through this filter until a gelatinous depost has formed on the surface consisting of myriads of bacteria and microscopic plants called algae. This deposit prevents the further egress of bacteria and by means of this method ninety-eight per cent. of all bacteria are removed from the water. Most of the organic material present is also oxidized by means of the bacteria in the filter, being converted into harmless nitrates.

The efficacy of these filters in preventing disease has been demonstrated in various large cities. Hamburg during an epidemic of Asiatic cholera developed about five thousand cases of this disease, while Altona, just adjoining it and using the same water supply, was practically free from the disease. The water passed through sand filters before reaching the consumer in Altona, while Hamburg used unfiltered water. The latter muuicipality has since built a very expensive sand filter bed.

Lawrence, Massachusetts, has practically been free from typhoid fever since the erection of its filter beds, whereas, before this time, the city has been visited by many epidemics of this disease.

5

This simple method, therefore, rids the water which we drink of many harmful bacteria and its more general adoption cannot be too strongly urged.

These methods, together with the examination of sputum for tuberculosis, the determination of the potency of various antitoxines, the examination of blood for the typhoid reaction and of milk for abnormal quantities of pus, constitute most of the work at present performed in municipal laboratories.

DR. AUGUST STABLER, Brighton: How long does this sand filter last, I mean how long is it a perfect filter and how soon has it to be changed?

DR. STOKES: That is an important question and I should have spoken of it. The sand does not do the filtering but the bacteria soon form a gelatinous deposit on the sand, and, by preventing the further passage of bacteria, they make a true filter. The filter then can be used year in and year out but has to be occasionally cleaned. This cleaning is necessary about every two or three weeks. The gelatinous deposit is scraped away, the water, which was turned off into another channel during the cleaning process, is allowed to run in again and another deposit forms.

DR. JAMES H. MCCORMICK, Gaithersburg: Relative to the making sand filters for the large cities and towns the question of cleaning is one that, from an economic standpoint, is of the utmost importance. As Dr. Stokes has said from three to five weeks is the average life of the filter, when it must be cleaned, and it is not only the cost but the lack of use of the water while the new film is forming. There has been a new filter made, composed of sand and slag, that is used inside of a sand filter. Bacterial examination has proved it to be superior to the sand filter, and, by an automatic appliance, the stream may be reversed and the filter cleaned out in a few hours, when the water is ready to use. From reports that have been received from Germany recently it is proven that they can be built more cheaply, run more economically and at the same time are more satisfactory.

DEMONSTRATION OF THE CHEMICAL EXAMINATION OF DRINKING WATER.

BY W. B. D. PENNIMAN, A. M., PH. D.

I first want to make a statement as to what a chemical analysis of water involves. The ordinary idea of it is that it is the same kind of analysis as that done in examining a sample of iron ore in which the test is the same wherever the specimen came from. In the examination of water, however, the circumstances are somewhat different. The chemist takes a very large quantity of

water and proceeds to examine for certain substances that are found naturally in water, or are present or produced by chemical means that are not usually present. We find, for example, that urine contains about 5800 parts of chlorine in the million, in the form of common salt. In the case of natural water the amount seldom runs over about 6 parts per million. Our first step, then, is for the estimation of the amount of chlorine in the water and, if we find it exceeds certain limits, we are justified in presuming that the water has been contaminated by some substance containing a large amount of common salt. The next step is the determination of the amount of total solids, which is often a matter of considerable importance. A measured quantity of water is placed in a dish and by heat evaporated to dryness. The amount of mineral matter present is of course of importance in just so far as the substances that make up that mass are of importance. We examine for magnesium sulphate, lime, sodium sulphate, etc.

The most important part, however, of a chemical testing of water for sanitary information is the determination of nitrogenous matter; that is noticed when it is contaminated by animal matter, particularly that of an organic nature. This material, which is introduced into the water, cannot be determined by its taste or odor. A large quantity of the albuminous matter will pass through the ordinary natural filtration without sensible change unless the filter is very thick. The first step then is to boil the water with an agent that decomposes whatever animal matter may be present and converts it into albuminoid-ammonia.

The nitrogenous material generally exists in water as the carbonate. It is treated with alkaline permanganate of potash, and the first change is the formation of free ammonia. The next change is the formation of nitrites and finally the oxidation is complete and it is found in the water in the form of nitrates. The examination then consists in determining the amount and character of residue, the amount of organic matter gotten by evaporation, and we then proceed to study the changes that the organic matter has passed through since being introduced into the water.

Let us take a sample of impure water. This specimen which I prepared contains a small quantity of ammonia, about twelve one-hundredth parts per million. I add a small quantity of Nessler's reagent. In the course of a few minutes you will see that the color of the water has changed entirely. It is now quite yellow and the depth of the color measures the amonnt of ammonia that was present. We can estimate about one part in 20,000,000. We have here two cylinders and we add to one of them, which is graduated, a mixture containing a known amount of ammonia, the standard being 1500 parts per million. The water has the Nessler reagent added, and we then draw off a

portion of the darker liquid until we make colors match, and by reading off the figures we can without difficulty detect and estimate the amount up to the limits I have stated.

The next examination is one for nitrates, and, if they exist in more than a very small quantity, we condemn the water entirely, for they indicate that active decomposition is going on. The test is even more delicate than the one I have just shown you. I add the reagent to this water, which contains nitrites, and in the course of a few minutes a red color develops and its depth is measured in the same way as before. It is plain that this process is delicate to the extent of one part in 50,000,000.

Now for the estimation of nitrites. In principle it is done in about the same way. We evaporate a measured portion of water, usually 100 c. c. Add to the residue a mixture of strong sulphuric and carbolic acids, and then we add a small quantity of water, and a characteristic color is formed; in this particular case it is yellow. There is one point that I ought to mention; the water I have been using is not a natural water, but was prepared for the purpose, and is about ten times as strong as that usually found. There is one other test, and that generally used in the so-called popular ways of judging water, and that is the test for chlorine. In the method generally advised you are told to treat the water with silver nitrate, and if it becomes pearly, it contains chlorine. That is true, but all water contains some chlorine, and it is necessary to estimate the quantity if the test is to be of any service to you.

In regard to popular tests; there are quite a number of them but none of them are worth anything. The one by which you test the water with silver nitrate, as I have just said, is useless. Distilled water and properly cleaned vessels are seldom at your disposal. The best test I know which can be used in the country districts is a modification of any I have ever seen proposed, and can be easily applied. The source of contamination is usually a closet, stable or pig-pen, and in these cases the question can be determined frequently by adding about five gallons of coal oil to the suspected place and see if it finds its way into the well. It is not a delicate test, but often it will convince you and your patients of the condition of the well.

Now in regard to filters, and particularly those of the household; they are most of them modifications of the Pasteur filter and consist of a porous vessel through which the water percolates and in that way is purified. They are all very good for a short time but those that cannot be cleaned are bound to be in the end a source of trouble.

The bacteria will find their way through the pores of the filter and unless we can remove a portion of the filter and clean it may become dangerous. The back washing does not cleanse the filter

sufficiently well to make it safe. The only thing to do is to clean it by fire.

I would like to add one word on a point raised by Dr. Stokes. The chemical examination of water does not show the presence of any specific organism; it is not intended to do that. It does show the fact there has been organic matter present in the water and to some degree, the amount of decomposition it has undergone.

OBSERVATIONS OF A COUNTRY DOCTOR UPON THE SOURCES AND SPREAD OF TYPHOID FEVER.

Dr. Thomas B. Owings of Ellicott City.

Dr. Owings said: Mr. Chairman and gentlemen. I had promised Dr. Fulton to prepare and read a paper on the origin and spread of typhoid fever. Sickness has prevented my doing so, but at his request I will endeavor to give a few facts as seen by a country doctor.

Forty-five years ago, when I left college, bacilli were not known, and had any one advanced such a theory, most likely he would have been thought a lunatic; but now, thanks to the rapid strides which scientific investigations have made, diagnosis of diseases, among them typhoid fever, can be determined often from the outset of the attack.

At that time little attention was paid to the causes or origin of typhoid fever, and as little was known of its rational treatment, until Dr. Power's treatise upon that disease. Now thanks to scientific investigation, we can tell to what it is due; and often the cause removed, renders the treatment more successful.

The spread or increase of typhoid fever is due to many causes. First, negligence and a want of cleanliness around premises, particularly from decomposition of animal and vegetable matter thrown in piles near the door. Secondly, a want of care as to springs and wells, by the drainage of sinks, closets and hog-pens polluting them, barn-yards with stagnant pools oozing through the soil into springs. Thirdly, the necessity of using water from sources where the quantity is not sufficient to produce a running stream, due to the long drought, where springs and wells have gone dry.

By far the largest proportion of our cases are due to the polluted condition of the water used for drinking and cooking; the want of cleanliness in the dairies polluting the milk; slaughter-houses with the refuse left to ferment in the sun, and finding its way through the earth to the streams supplying springs and wells.

Seldom do we in the country have to deal with the drainage nuisance as do you gentlemen in the cities, but occasionally in schools and hotels fever breaks out and on investigation we find defective drainage.

And now with your permission I will cite a few cases which I consider of interest.

An epidemic of some 80 cases occurred in a village near me. The houses were built against the hill-side; a spring between each double house supplied the water for drinking and cooking; each family had a hog-pen on the hill-side in the rear of the houses, with the excretions soaking into the springs. When the hog-pens were removed and the use of the springs discontinued the disease was broken up.

I observed an outbreak in another instance where the mouth of a cistern emptied into the river with closets used by 150 people emptying into this cistern; the tops being sealed so that the accumulation might be used as fertilizer. When this nuisance was discovered and abated no new cases occurred.

Another case which I thought interesting. I was called to see a patient with fever, and in a few days two more cases developed. Upon examination I found a well with a large stagnant pool at the side; horses were constantly watered there; forty ducks enjoyed the pond, which had no outlet, except to return to the well. I locked the pump, had the pond filled up, and drain put down to carry water off. No more cases occurred and the patients recovered well.

In another instance I was called this season to attend a case of fever at a farm-house. I inquired for the hog-pen. I found it about twenty feet from the spring on the hill-side. I ordered the pen removed and earth carted to the field. Convinced that I had found the cause, but desiring to leave no doubt, I had a ditch dug above the spring until I reached the rock, and found a sand-rock with seams. Taking a crowbar I broke away a part of the rock, and then found a seam discolored by the drainage and leading into the spring. I then sent a demijohn of the water to Dr. McShane. A few days afterward I received a letter from him, asking me to call at his office, when I saw a specimen, which Dr. Stokes had examined, loaded with colon bacilli, which so often are associated with typhoid organisms.

And now I hope this Conference will result in giving us better facilities for such investigations, so that we may be able to unearth the causes, and more readily combat the inroads of this dread disease.

DISCUSSION.

Dr. Stabler: The question just occurred to me in connection with the last case cited as to how the original inoculation occurred in that hog-pen to develop the typhoid bacillus. The hogs have evidently not had the typhoid and I would like to ask whether in dry seasons the germs cannot be transferred from place to place by the winds and thus contaminate the water.

Dr. John S. Fulton: Dr. Stokes is absent from the room, and cannot therefore speak for himself. In reply to the inquiries just made, one of which seems to be whether the bacillus detected in the drinking water was indeed typhoid bacillus, I would say, that it is not likely that Dr. Stokes found the typhoid bacillus. In fact, it is very unlikely. What he did find was the bacillus that is commonly associated with the typhoid in drinking water, and whose presences proves the contamination of water by intestinal discharges, and that is the colon bacillus. That bacillus must have come from the bowels of some animal, not necessarily the human animal. Its discovery did not prove that the typhoid germ was present, but only that there was a direct route into the well for any sort of bowel germ.

The carrying of the typhoid germ by the wind is possible of course, but not much stress is usually laid upon it because other modes of convection are so much more common and important. The probability that it is so carried has been well illustrated at some of the army posts in the West. Typhoid has been observed in new camps, in regions previously uninhabited. The water for drinking and cooking was hauled from remote springs previously unvisited by man, and stored usually in barrels or cisterns. Typhoid has been observed to follow the arrival in the camp of a recruit ill with the fever. There could have been under such circumstances, no direct contamination of water supply, and the germ must have reached the cisterns as dust, the discharges having been thrown out upon the ground without disinfection. It has happened that in such a camp the Chinese laborers who live in the most unhygienic way, escaped infection entirely. The explanation is that they drink no raw water, tea being their customary beverage. I see that Dr. Stokes has returned to the hall, and I shall repeat to him the question asked by Dr. Stabler.

Dr. W. R. Stokes: In regard to the case that Dr. Owings described, I may say that the typhoid bacillus is a very delicate organism and it is a difficult matter to grow it from the water supply. It is too long a process to adopt in the routine examination of drinking waters, but it can be done. The organism that I found in the water brought me by Dr. Owings was the bacillus coli communis.

Dr. A. K. Bond: I think sometimes typhoid fever may be contracted from cases not recognized as such. In some of its forms in the adult it is so mild that it cannot be easily diagnosed and the patient may not be considered to have typhoid, but, of course, the stools from such a patient will contaminate the water supply. This is particularly noticeable in the disease in children. I have seen cases of typhoid fever, and I had every reason to believe they were such, in which the disease looked more like bronchitis, and I think they would have been taken for such if they had been isolated cases. Perhaps some of us owe our immunity to the fact that we had it in childhood. I recollect that some years ago Dr. Anderson, from down in one of the counties, held, in a paper read before our Faculty, that a typhoid fever epidemic had started in his little town after certain streets had been torn up and the ground exposed in a peculiar way. He was laughed at at the time, but the statement chimes in with what Dr. Fulton has said in regard to the military camps.

Dr. W. J. Todd, Mount Washington: I have recently had a young child with typhoid fever in a family at Mount Washington. The house was situated high and dry, the water supply was obtained from an artesian well and the lady in the house took care of the dairy herself. The symptoms were certainly those of typhoid in a small child, and upon questioning the mother closely as to the other members of the household I discovered that a nurse had left the house and gone to the city sick. Later on I learned that she had typhoid fever and that for two weeks past she had had a diarrhoea, and during that period she had entire charge of the child, so I thought I was safe in attributing the affection to this cause. I would like to ask how a young child, or at least what is the youngest age at which anyone has seen typhoid fever. Is it possible for a child of one and a half or two years to have typhoid fever?

A Member. I have seen it from one year up to eighty.

Dr. J. McPherson Scott, Hagerstown: This discussion carries with it the fact that the water we drink ought to be as pure as we can get, and we ought to do something practical at this conference. As to what age typhoid fever can develop, or how often it can occur in the same individual, should be discussed elsewhere. After the presentation of the facts we had from these gentlemen this conference ought to make some suggestion as to caring for the water supply of the State and municipalities. This question of water supply to the municipalities is as important as any that can be presented to the people of Maryland. In Massachusetts there is a law forbidding the act of incorporation unless it carries with it an approved supply of water. I therefore offer this resolution:

Resolved, That the Board of Health present to the Legislature the necessity of such legislation as will require individuals or corporations supplying municipalities with drinking water to adopt such methods of filtration or purification of the water supplied as may be approved by the State Board of Health.

This resolution was suggested by the statements made by Dr. Stokes as to the reduction of bacteria by filtration and by some other gentlemen that there is a filter in use that is as good and cheaper. Now, I know how it is in the towns throughout the State. Individual communities may be unable to get such an act, but it can be passed through the State, and this conference ought to endeavor to give the people some degree of security as well as to sit here and enjoy these demonstrations. We are here at the expense of the counties and the people must see coming from this convention some practical results.

Dr. F. H. Thompson, Annapolis: In speaking to the point I think that what we need in this State is a chemical and pathological laboratory to which the people can send specimens for examination. This is one practical thing for which this conference ought to work.

Prof. W. B. D. Penniman: In regard to the proposed motion, which is, as I understand it, that such a law be passed that no water can be supplied except it be filtered, I think that is a good law in certain ways, but is not exactly the way in which we care to put it, for this reason: Take the supply of the city of Baltimore; I had it under my charge for some years. It has undergone examinations that run into the hundreds, and at no time have we had reason to believe that it required filtration. If we recommend that all water supplies be filtered, it seems to me that we are asking too much. Take, for instance, the water furnished some of the towns in Maryland that comes from artesian wells; that water doesn't require filtration; so I would offer this amendment: That no town shall be allowed to furnish water unless the same be approved by the State Board of Health, the latter to have the right of prescribing what means of purification shall be used.

Dr. T. A. Councell, Easton: I second the amendment of Dr. Penniman's, but I suggest that they be required to have the water submitted once in 30 or 60 days. I would like to ask Dr. Fulton what provision is made for examination of the water supply of towns and at whose expense this examination should be made.

Dr. Fulton: The State Board of Health makes the chemical examinations without cost to anybody except for the purchase of a container in which to ship the sample. Send to the Board of Health for a blank directing you how to take a sample of water; send that sample to Prof. Penniman, who pays the expressage,

and send the blanks back to the Secretary of the State Board of Health, who authorizes the examination. As far as the bacteriological examinations are concerned, we have at present no money to apply that way, and we have no pecuniary need which bears so heavily upon us. At present such examinations have to be made at the expense of the individual.

In regard to the inquires made by Drs. Stabler and Todd; the question of immunity is important and interesting and I think the convention would be glad if Dr. Welch would speak upon that subject.

Dr. W. H. Welch: I must believe that there is a very considerable degree of immunity brought about by a preceding attack. There is no question that a single attack affords some protection from further attacks, but of course it is not sure protection. We have no means of determining whether a patient is or is not susceptible to typhoid fever. This blood reaction is probably not a safe index of immunity and we have no proof at present that the absence of blood-serum-reaction indicates any particular susceptibility to typhoid fever. This substance which causes the reaction is certainly not identical with the immunizing substance. As regards the other points that have been under discussion since I came into the hall, I am not sure as to the wording of the original resolution and would like to hear it read.

President then read the resolution of Dr. Scott.

Prof. Penniman offered the following substitute:

Resolved, That all water supplied to municipalities or sold to the public generally shall be examined at intervals by the State Board of Health and if found impure shall be filtered or otherwise purified as prescribed by the State Board of Health.

Prof. Penniman moved that the resolution and amendment and all other resolutions be sent to a Committee to be considered and reported upon at the evening meeting. The committee to consist of five, appointed by the chair.

Dr. Scott: I second the motion.

Dr. Wm. H. Welch: It might be a waste of time now to discuss this resolution, but cannot this committee be instructed also to report upon that other mattter, the importance of providing for a bacteriological laboratory or the services of a bacteriologist for the use of the State Board of Health? Dr. Fulton has just said that he has no means for making a complete examination of the water. He can only make the chemical examination and it is well known that the examination ought to be complete to be of any value. It involves also, I think, the visit of an expert to the source of supply to see for himself if there is contamination. If he finds that there is contamination, the other examinations are not necessary.

I would suggest that this committee widen its limitations and bring in suggestions providing for funds or some means by which there shall be placed at the disposal of the State Board of Health the services of a bacteriologist.

Dr. J. H. Billingslea, Westminster: I would like to ask whether it is possible for the smaller towns to put in a filtering apparatus.

Dr. W. R. Stokes: There is a small filter in one of the cities of this State and, as they are not very rich, I presume it came well within their means.

Dr. August Stabler, Brighton: I would like to ask whether, if I have a case of typhoid fever in my neighborhood, I could apply to the State Board of Health to send an inspector there to properly examine the premises, and whether there are means provided so to do.

Dr. Fulton: I regret to say that you cannot do so with a good prospect of prompt and satisfactory service. The only inspector in the State Board of Health, who is a trained medical man, is the secretary. The demands upon the secretary's time are numerous. If Dr. Stabler sends to the State Board of Health, the secretary will visit his section and give him all the aid possible. But if, unfortunately, the secretary should be occupied with something more important, we cannot under the present laws send a deputy.

President Gilman: I understand you all to agree that the committee be appointed to consider the entire subject of examination of water throughout the State, and to report this evening; is this agreeable to the gentlemen? (Having secured their agreement the resolution as amended was put to vote and adopted.)

I will name for the committee on resolutions, Dr. J. McPherson Scott, Dr. W. H. Welch, Dr. J. S. Fulton, Prof. W. B. D. Penniman, and Mr. Chas. Hartshorne.

The meeting then adjourned.

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*ILLUSTRATIONS OF THE RELATION OF SCHOOLS TO DIPHTHERIA AND THE RESULTS OF ISOLATION AND DISINFECTION.

By Dr. John S. Fulton.

I am about to undertake the somewhat ungracious task of demonstrating that the schools are an important link in the chain of causes propagating diphtheria. Before I begin, I want to

*Erratum. This article should appear at the end of the first evening session, after Dr. Ames' article, page 58.

point out a distinction between that part of the programme which you have already heard and that which I am to present. After I am through you may dissent from my conclusions, though I shall make it as difficult as I can for you to disagree with me. But as to the truth of what the preceding speakers have said there can be no doubt admitted. I am going to present an argument, but from them ye have received the law. Dr. Stokes has here enough caged and bottled murder to decimate this town. He has handled it with impunity, and you have also handled it just as safely. He has illustrated for you most of the things which can be done with this deadly germ in the laboratory. Other gentlemen have told you about the work of this germ when at large, and have shown us how it is to be combatted in the home, in the school, and in the person. Do you believe these things?

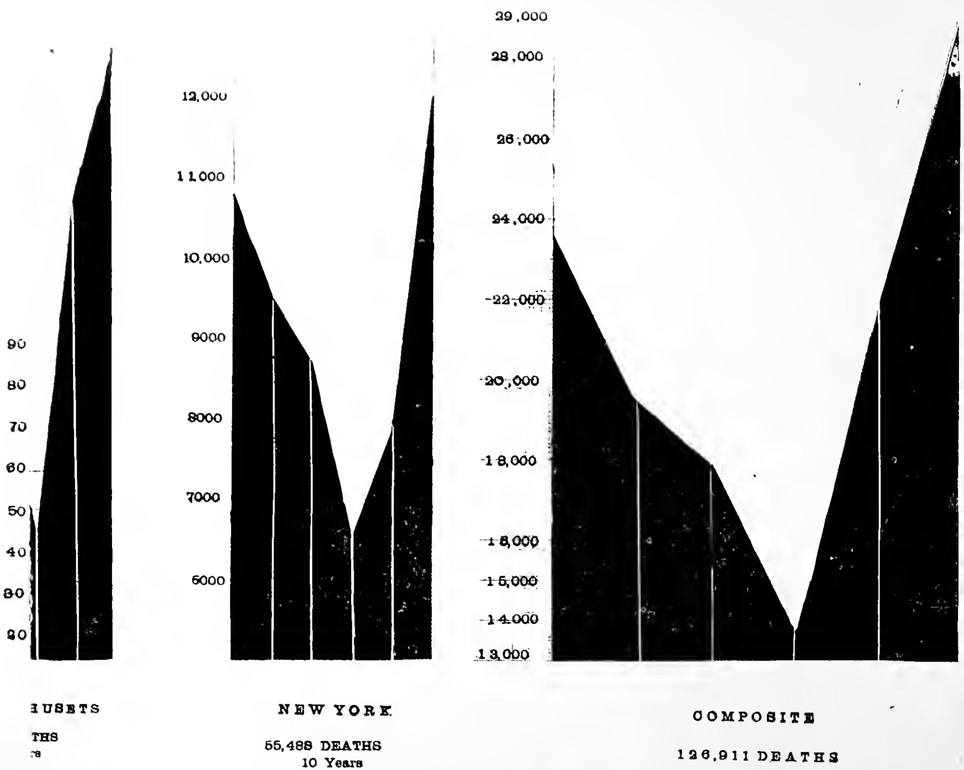
It never ceases to be strange that new truths find the human mind so difficult of access. Some teachers in a certain enlightened American city recently refused to accept the conclusions of the bacteriologists who examined the throats of their pupils, and it was sought to convince them by experiments upon animals. I trust this assembly has no representative of that wicked generation that seeketh after a sign, and does not demand a hecatomb of guinea pigs. These facts have passed forever beyond debate, and no facts will be presented at this Conference more pregnant of suggestion to thoughtful teachers. In my venerable friend, Dr. Stokes, and the other earnest men who have spoken, you have Moses and the prophets. "Hear them. If ye will not hear Moses and the prophets, neither will ye be converted though one rose from the dead."

I have here upon the wall a lot of charts which show the death rate from diphtheria in several cities and States for many years.

Here first is a nine year chart of the bi-monthly rate in Michigan. Each of these vertical lines represents a bi-monthly period, and I place a mark on each line at a height representing the number of deaths reported for two consecutive months. Six dots on six lines are the record for a year, and a line passing through all the dots makes what we call the mortality curve, and shows the fluctuations of the disease from month to month and from year to year. Now July and August are the vacation months and occupy the middle space in all the charts I shall show you. I ask you to observe, as I pass the pointer along, that vacation is always marked by a falling line, and the succeeding period by a rising line. This is true as to all nine of the vacation periods and as to six of the nine September-October periods.

Here are a six-year chart of New York, and a six-year chart of Massachusetts, showing twelve vacation periods with falling

DIAGRAM IV.



90
80
70
60
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8000
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20,000
18,000
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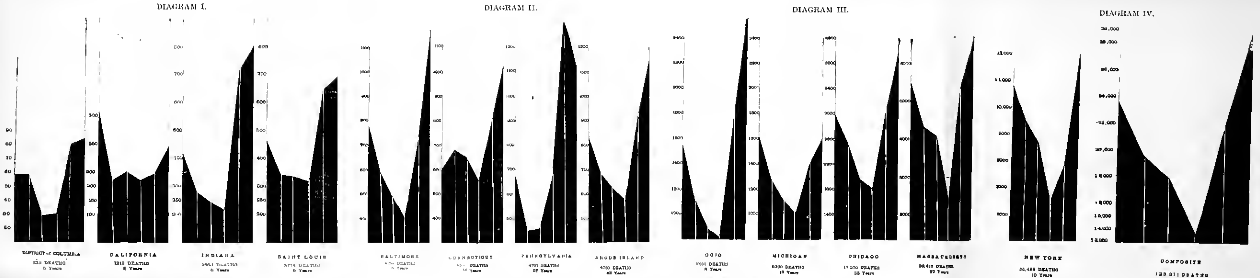
14,000
13,000
USETTS
THS
NEW YORK
55,488 DEATHS
10 Years
COMPOSITE
126,911 DEATHS



THE RELATION OF DIPHTHERIA TO VACATION PERIODS.—*Fulton 1896.*

lines and twelve September-October periods with rising lines. Now these twenty-one vacation drops and eighteen September rises are certainly suggestive. Let us test what they suggest by appeal to larger numbers and longer periods. Here are a number of charts made by adding the bi-monthly figures together as far as my library will serve. (Diagrams 1, 2, 3 and 4.)

Beginning with five years of the District of Columbia and proceeding through the reports of thirteen States and cities, we have a set of diagrams which approach nearer and nearer to a fixed type as we deal with larger numbers, until in the last (14th) diagram, which is constructed by adding all the others up in six columns, we have what may be considered the type of a diphtheria curve. Two diagrams are distinguished among the set, one for its striking likeness to the composite, and one for its wide variance from the other curves. The Michigan curve is typical and I want to say here that though I have set down the mortality of Michigan for the sixteen years, I have computed the curve not from the deaths, but from the sickness reports made up from the observations of not more than seventy-five or a hundred physicians. It furnishes a striking illustration of the fact which I tried to impress upon you this morning, that in statistics the analytical method will give as accurate results as the arithmetical.

Pennsylvania shows a curve agreeing with the others only as to the March-April and September-October periods. In the other periods it flatly contradicts the other witnesses. What shall we say then about those Pennsylvania statistics? Simply that they are false, relatively false by exaggeration in one line, and diametrically false in three lines. We should be justified in so pronouncing them merely upon their appearance, but there is other evidence that they are unreliable. See; only about as many deaths are reported in that great State in twenty-seven years as Connecticut reports in half the time.

Only one other State agrees with Pennsylvania that the diphtheria mortality may rise in vacation, and that is the District of Columbia with its trifling contribution of 339 deaths in five years.

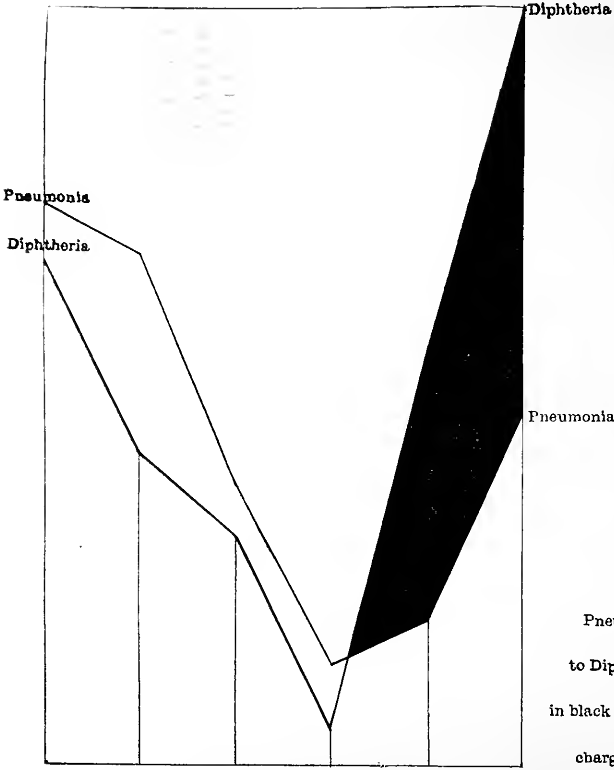
So we have fourteen witnesses of whom all testify that diphtheria always increases after vacation, and 12 testify that diphtheria always falls during vacation. The composite diagram, representing 126,911 deaths from diphtheria, shows that the mortality at the end of vacation is to the mortality at the beginning as 137 is to 138, and that the mortality at the beginning of the school year is to the mortality on the first day of October as 137 is to 219. Now this looks like a startling arraignment of our public schools, and I must make haste to relieve you of the horrors which these figures may induce.

The line would rise in late autumn, just the same if no schools were opened. Although the Klebs-Loeffler bacillus is a perpetual bloomer, it has its seasons, and diphtheria is rightly classed with the cold-weather diseases. There is a disease which is so closely related to atmospheric temperature that its prevalence may be calculated with surprising approximation from the monthly thermometric averages. Pneumonia is *the cold-weather disease.* Dr. Henry Baker has shown with mathematical conclusiveness, that the Pneumococcus is as sensitive to season as the wheat plant, and more sensitive than the rose. In Michigan, pneumonia destroys life at very nearly the same rate as diphtheria, and if we compare the curves of the two diseases we shall learn something.

After applying the pneumonia curve to the diphtheria curve in such a way that pneumonia will represent a slightly larger mortality, you will find that a large polygon is marked off the fall crop of diphtheria, and as this part of the slaughter is over and above that chargeable to seasonal influences, it certainly contains, and perhaps approximately represents, the autumal contributions of the schools to the death rate from diphtheria. (Diagram 5.) Please observe that I said autumal contribution, and do not forget that a contribution to diphtheria mortality is not an addition, but a multiplication, every case containing all the possibilities of an infinite series. You cannot, therefore, calculate the annual rate from the autumnal contribution, but you do know that its effects are perceptible throughout the year. It is not likely that the utmost vigilance possible on the part of teachers would prevent the schools from adding somewhat to the prevalence of infectious disease. Education, like any other great good, lays a special tax on human life, but education is worth the price. Ignorance and neglect are, however, quite reckless of human life. I show you these charts by way of contrast. Calculating from what has been done, you may see what utter neglect would cost on the one hand, and what rational care and vigilance can accomplish on the other. (Diagram 6.)

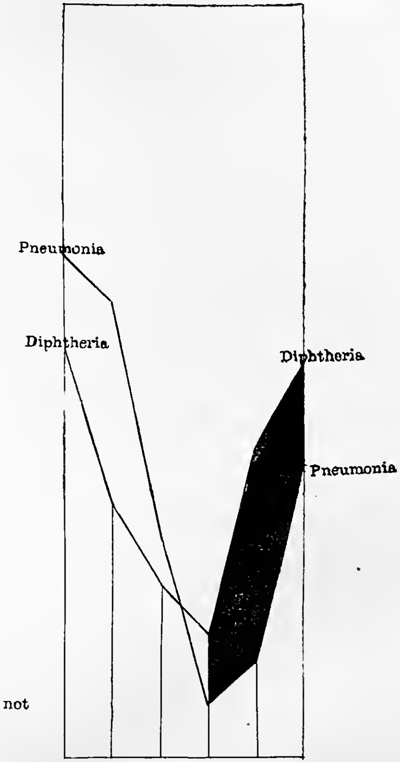
The Michigan Board of Health has for many years published diagrams showing the results of isolation and disinfection. I have added the figures of several years together, and found that during the period there were in Michigan 2,581 outbreaks of diphtheria, resulting in 18,084 cases with 3,961 deaths. (*Diptheria as it was. Middle Diagram.*) Isolation and disinfection were enforced in 1,061 cases. By comparing the results in these cases with the results where disinfection and isolation were both neglected, one finds that these restrictive measures affect the number of cases and the number of outbreaks in about the same ratio. If then isolation and disinfection had been enforced in every caee that appeared during those years, there would have

DIAGRAM V.



COMPOSITE

Pneumonia curve applied
to Diphtheria curve, sh[illegible]ng
in black the part of the mortality not
chargeable to temperature.



MICHIGAN

THE ESTIMATED AUTUMNAL CONTRIBUTION OF SCHOOLS TO DIPHTHERIA —*Fulton 1896*

DIAGRAM VI.

THE RESULTS OF ISOLATION AND DISINFECTION IN DIPHTHERIA, FROM MICHIGAN EXPERIENCE.—*Fulton, 1896.*

been but 1,313 outbreaks instead of 2,581; but 2,902 cases instead of 18,084; and only 670 deaths instead of 3,961. (*As it might have been. Diagram on the rignt.*) On the other hand, if no restrictive measures had been attempted in any case, the figures would have been 4,562 outbreaks instead of 2,581; 58,626 cases instead of 18,084; and 12,322 deaths instead of 3,961.) *As it might have been. Diagram on the left.*)

If the actual results as compared with the worst probable results may be considered to show what average medical skill and average fidelity of attendants will accomplish, the evident saving of life demonstrates that average skill and care are worth more than the market price. What shall we say then of the management of the 1,061 cases in which isolation and disinfection were faithfully practiced? Surely the diagram on the left shows that such service is so far above the run of the market as to be beyond price. And yet these procedures are not of extraordinary difficulty, but, on the contrary, are within the capability of every one who is fit to be a physician, a health officer, a parent or a teacher.

The Conference then adjourned.

MINUTES OF THE SECOND EVENING SESSION.

THURSDAY EVENING, FEBRUARY 18TH, 1897

The meeting was called to order by Dr Schaeffer at 8.30 o'clock, P. M.

DR. SCHAEFFER: Dr. Stokes will pardon me for saying that the Committee on Sanitation consider him as the first fruits of their efforts. He was appointed by Mayor Hooper to his important position as Bacteriologist to the City Health Department, and elected unanimously. We have had great pleasure in witnessing his demonstration today. I will now have the pleasure of introducing to you the head of the City Health Department, Dr. James F. McShane, who has for some years been the efficient Health Officer of Baltimore, and consents to be the Chairman of this session.

DR. MCSHANE: We shall take up the unfinished part of the afternoon programme, and continue the discussion of typhoid fever. The first number is "The Disguises of Typhoid Fever," by Dr. Wm. Osler.

DR. OSLER said: The older we grow the less we know. That, at any rate, is what I sometimes feel when the knowledge on which one is accustomed to rely is brought to a dead halt before

the blank wall of a fever. What confronts us? Is it malarial, or typhoid, or what?

Now, in typhoid fever early diagnosis is often difficult, and sometimes the disease completes its course unrecognized. In about 530 cases, we have had two in which diagnosis escaped us in the wards, and was made by Dr. Welch in the pathological laboratory. I am convinced that a great many cases occur both in town and country in which the diagnosis is never made, either *intra vitam* or *post mortem*.

Typhoid fever may have a text-book symptomatology, or it may have no single suggestion of the typical fever of the text-books. The doctor is deceived by its localization, and his diagnosis goes astray in one or another of three directions. In the first place, it may begin with such marked cerebro-spinal manifestations that the physician is misled at the start. It may not enter his mind during ten or twelve days' attendance that he is dealing with anything other than a case of cerebro-spinal meningitis. A certain number, and I venture little when I say a large number, of the cases of cerebo-spinal meningitis reported to Doctor McShane are really cases of typhoid fever, disguised by cerebo-spinal localization. Beginning with headache, marked retraction of the head and neck, and lacking no feature of cerebro-spinal meningitis, the diagnosis seems so clear to you that you do not look for the spots, nor examine the spleen. I speak not of theoretical cases, but of cases such as I have myself followed through the clinic, and into the autopsy room. I have records of some three or four cases in which the clinical diagnosis of cerebo-spinal meningitis has been made, but the autopsy demonstrated the lesions of typhoid. We have had one case in which not only were the symptoms suggestive of cerebo-spinal meningitis, but in addition to spasm of the muscles of the neck and back, the patient had clonic contractions of the head and arm muscles.

Another localization is in the lungs or pleura. You see the case as one of pneumonia. The first subjective symptom is a stitch in the side; you find the physical signs of pneumonia, and you are thrown off your guard entirely. The pleurisy cases are not so common as those of pneumonia. We have had one well marked case of typhoid fever in which the symptoms were characteristic of pleurisy, and which was admitted and treated as pleurisy for one week. The pneumonia cases commencing with pain in the side, rusty expectoration, high temperature, tubular breathing, and indications of the involvement of a lobe or the entire lung, are more deceptive. You give a diagnosis of pneumonia. So it is, but about the tenth day the crisis which you expect doesn't come. The temperature persists, the abdomen becomes tender, and you have the extreme pleasure of telling the family that "typhoid symptoms are developing." What a blessing it is that Louis invented this phrase "typhoid symptoms."

One of our errors of diagnosis was in a case of that kind, an old man admitted with all the symptoms of pneumonia. It didn't occur to us that he had anything else than pneumonia until Dr. Welch examined him, when it became quite evident that he had typhoid fever.

Another mode of disguise is acute nephritis. That, fortunately, is rare, for such cases are almost invariably diagnosticated as acute nephritis, and are not recognized as typhoid until a week or ten days have elapsed.

These are the chief errors of diagnosis, and I often find that practitioners have not had their attention sufficiently called to the fact that typhoid, by reason of unusual localization, may present these subtle disguises.

There are certain conditions that simulate typhoid fever. The simple continued fever, running a week or ten days, about which we have heard so much, is such an affection. You are safe to follow Murchison's opinion that the fever without local manifestations, persisting ten days, in a temperate latitude, is likely to be typhoid. You must bear in mind that there are cases of typhoid having fever as the single manifestation; without the swelling of the abdomen, without headache, the patient feeling well and anxious to get up. If allowed to get up, he may demonstrate the diagnosis in a most unpleasant way, by fatal hemorhage from perforation, as unhappily occurred in a case which I recently saw. We have had in the past seven years a number of cases in which the diagnosis was not made during the preliminary fever for which the patient came into the hospital. The temperature dropped two or three days after admission, a period of apyrexia continued three or four days, and then the nature of the original disease was shown by the onset of a relapse.

There is only one disease in this latitude with which typhoid is likely to be confounded, and that is the aestivo-autumnal intermittent fever. Now when I tell you that only a few months ago we treated a case for five or six days, the blood examination having been made, (though not by Dr. Thayer or myself) and that until the sixth day we did not discover that we had been tubbing and treating as typhoid a case of malaria, you will understand that the similarity may be very striking.

The diseases differ first as to the mode of onset. As a rule, in typhoid fever, there is much longer period of malaise. The patient is out of sorts for many days and epistaxis frequently occurs. Herpes is a complication of typhoid, and it is one of the commonest in malaria. Chills and chilly sensations are very common in both typhoid and malaria. A very considerable number of typhoid cases begin with a chill. Positive chills, occurring at intervals of two or three days, are more common of course in malaria, but if you take into consideration the chilly

6

feelings, they occur in about half the cases of typhoid. Distinction is much easier if you see the cases early, as you usually do in private practice. In malaria at the onset there are positive intermissions in the first week; in typhoid there are no intermissions, but a gradual slope upwards. In the second week the difference is very marked. There is no single disease in which so steady a fever is present as in typhoid. We have now dozens of charts, even from cases under treatment by cold baths, in which the diurnal range did not exceed one and a half or two degrees.

Examinations of the blood is, of course, an important point, particularly now since the Vidal method of serum diagnosis has come into practice. In a certain number of cases of malarial remittent and continued fevers, the examination of the blood has to be made repeatedly and at short intervals, for the parasites are not present in the circulating blood in large numbers. It is essential that those who are to make examinations of the blood in malaria should have proper preliminary training. Experience in general blood examinations, and an acquaintance with the many forms of the malarial parasite, are necessary to satisfactory conclusions, whether positive or negative.

Is there a typho-malarial fever? Yes, in the brains of the doctors, but not in the bodies of the patients. There is no combined or hybrid disease, and it is only due to Woodward to say that he did not recognize a hybrid disease. Typho-malarial is a villainous name, and should be banished from our vocabulary. No doctor should ever use it, particularly to his patients. It gives a man a wrong sense of security, and the doctor wastes a lot of good medicine, a lot of quinine for instance, because he thinks that some symptom or other points to malaria. I am happy to say that cases of typho-malarial fever are disappearing slowly from the health reports. They ought to be banished entirely. The State Boards of Health should return his blank to every physician who sends in a certificate of death from typho-malarial fever and ask for something better. It is too late in the day, gentlemen, to make that diagnosis.

SANITARY SURVEY OF TOWNS AND VILLAGES FOR THE PREVENTION OF TYPHOID FEVER.

By John H. McCormick, M. D., Washington, D. C.

No class of cases appeals to the interest of the physician, be he in city, town, village or country district, as do infectious or contagious diseases. In cities and large towns, the great mass of people crowded into a comparatively small area, the consequent

lack of light and air, poor ventilation, faulty plumbing and the accumulation of dirt and filth, present an array of potent agents, favorable to the rapid dissemination of such diseases.

In the village and country, the small and poorly built houses, the absence of sanitary conditions generally, surface drainage, the water supply and the ignorance of people relative to general laws of hygiene, together with the peculiar habit, which is quite prevalent in this State, of servants going home to their families at night, are all avenues for the spread of infection.

But the difficulties encountered in preventing the spread of such diseases, and in eradicating them when once they have gained a footing, while seemingly greater in the city than in the country, are, in fact, greater in village and country; for in the former there is a concentration of municipal authority to make and enforce local regulations, more or less satisfactory water and sewerage system, means of isolating and quarantining patients and premises, which effectually stamp out an epidemic in its incipiency.

On the other hand, in the rural districts, the local town councils, or county authorities, either do not have the power to create and execute health regulations, or else the fear of public criticism or censure restrains them from making any movement for the betterment of the sanitary conditions of the community. The inability to isolate patients, and establish a temporary quarantine, because of the prejudice of the family, and the pernicious practice of visiting the sick, for which the attending physician is himself largely to blame, many times not having the courage to incur the displeasure of the neighborhood by forbidding it.

The most prevalent zymotic disease in the latter localities is typhoid fever, because the conditions mentioned favor its development. It is taken for granted that the etiology of typhoid fever is now settled beyond question, and that there are four sources of infection, one or all of which may be factors in any given case, and they are in order of frequency:

1. Impure water supply.
2. Imperfect drainage of a polluted soil.
3. Infected milk.
4. Other causes.

Since the source of the drinking water is usually from springs or wells, and the opportunity for becoming polluted is very great by reason of surface drainage, our first effort should be the removal of every means of infection, which it is practicable to do, and for this purpose a few suggestions will be offered, by no means new or novel, but merely as a guide to formulate a system for the establishment and regulation of sanitary conditions in communities.

Such precautions in the country are not only desirable, but necessary, to afford immunity in the locality itself, but are of first importance to the cities, for a large percentage of the cases of typhoid fever, occurring in the fall months in cities are found upon careful investigation, to have boen incurred in visits to the country during the summer, and develop upon the return of the victim to the city.

Again, the great quantities of milk used for infant feeding and other domestic purposes frequently becomes contaminated from the impure water used in washing milk containers, or the udders of the cows, or, as not seldom happens with unprincipled dealers, by adulteration of the milk, as every one connected with the department of health, or analyzing chemist, has had occasion to learn.

This was clearly and graphically shown in a report made by a committee of the Medical Society of the District of Columbia, in June, 1894, based upon the returns of death certificates, recorded in the health office of the District.

The question to be determined was, did the great number of cases, with the high death-rate of 6.7 per cent., result from the pollution of the Potomac River, from which the city derived its water supply, or from the many pumps or wells scattered over the city?

The report covered a period of five years, from 1885 to 1890, and divided the city proper into four districts.

District 1. The southeast and southwest, fronting on the river and Eastern Branch.

District 2. The northeast.

District 3. The central.

District 4. The western, fronting on the south and west, upon the river and Rock Creek.

The total number of cases, including Georgetown and county, was estimated at 9,220, based upon the asssumption that each death represented ten cases of fever. The percentage of deaths in each district according to population is as follows:

	Population of region Police Census, 1892.	Total deaths from typhoid fever in five years in each region.	Annual rate of mortality to 10,000 population per region.
I. (South)........................	62,218	197	6.3
II. (Northeast).....................	26,278	84	6.2
III. (Central)........................	70,865	179	5.
IV. (Northwest).....................	49,969	114	4.6
V. (Georgetown).....................	16,344	52	6.3
(County).......	30,429	95	6.2

Now since the mortality of the entire District is 6.2 per cent., the southeast, Georgetown and county, are practically the same, while the central, with the densest population, is 5 per cent., and the western, with but 20,000 less population, is only 4.6 per cent.

The two latter are the best sewered and paved, and inhabited by the wealthier class, who use the river water, and who spend a good part of the year out of the city, while the others are poorly sewered or not at all, and drink from river and well water, the latter of which is more abundant in these sections, have less number of inhabitants per district, and a greater mortality.

From these facts two questions may be asked: why should the mortality be so high, in the central and western sections, where the sanitary conditions are to a great extent all that could be desired, and where Potomac water is principally consumed? second, why does a higher mortality obtain in the other districts? Does the river water cause the cases; are they imported, or are they the result of local conditions?

Concerning the former, Dr. Theobald Smith demonstrated before the Biological Society of Washington, in 1892, that there existed a relation between turbidity and the presence of bacteria. "Bacteria were most abundant in water, January and February having the highest average; August, September and October, the months of the greatest prevalence of typhoid fever, having the lowest. Bacteria, most of which were harmless, were most abundant after heavy rains, and their presence, in association with turbidity, proved the then source to be from the washing of the surface of the soil."

Therefore, we must conclude that a considerable percentage must be imported from the country, or else due to local causes.

For reasons before noted, the local sanitary conditions were reduced in these sections almost to a minimum, and this demonstrates that cities are interested in the sanitation of the country.

On the other hand, in the remaining sections of the districts, where a good part of the water supply is from wells, with a less shifting population, of less density, and a higher mortality, we find a great many privies or earth closets, showing conslusively that the fecal material has saturated the soil, and together with surface washings, has entered the wells, and the consumers become infected. If this be true of the city, how much more is it the case in villages and the country, for as this same eminent authority above quoted, further says: "The rainfall carries into the river whatever may happen to be on the surface of the soil, clay, manure from the fields, inorganic or organic matter of any sort."

The nature of this country through which the Potomac flows, much of it being mountainous, as well as the absence of large cities on its banks, diminish the risks of infection from this source. As the country becomes more and more under cultivation, turbidity and impurity from the washing will be more common. The possibility of the introduction into the water of the micro-organism of typhoid fever is dependent upon its presence in localities washed by the Potomac and its tributaries.

To illustrate: in fourteen squares in the southeastern part of the city were found 289 privies, 355 closets with sewer connections more or less leaky, and a mortality of 6.3 per cent. In the same number of squares in the northwest section 153 privies, 297 closets with sewer connections, and a mortality of 4.6 per cent., or nearly 50 per cent. lower privies, and not quite two per cent. lower death rate. These figures are conclusive.

By a detailed study of the location of the pumps and the occurrence of deaths from typhoid, it was found that wherever a pump was located, well patronized by the public, around it would be found an area affected with typhoid, and an examination of the water usually proved it to contain noxious bacteria. These pumps, when found, the local authorities closed and the cases of typhoid speedily disappeared.

These facts are given in some detail, because they have been personally investigated, and because they are but the type of all such conditions. The location of sources of infection in cities and large towns is comparatively easy, because of the regularity of streets and the presence of facilities requisite for detection.

In the country and village this is not so; the irregularities of streets as to direction and grade, the absence of water and sewer systems, the close proximity of privies, earth closets, cesspools, hog-pens, stables, the pernicious practice of housekeepers and servants throwing dirty dish and wash water out of the kitchen

about the well, which is usually, for convenience, near the door, with the coping very low or absent, all favor the admission of bacteria into the well.

With such unfavorable conditions how can it be determined just what is the source of infection, unless you wait till after a case develops, when it is of course too late to prevent further cases which have been exposed to the source of infection, and this if found may only relieve one avenue of infection.

The only way is to make a sanitary survey of the community, if a village; and of the houee and out-buildings near the well or spring, if a farm, for the latter if used as a dairy supply may infect the milk.

The following points in the survey should be noted:

1. Location of water supply (well or spring.)
2. Location of privy or closet.
3. Location of stables or hog-pens, etc.
4. Topography of land.
5. Cases of infectious or contagious diseases.
6. Number of persons in house.
7. Disposal of slops, dish-water, etc.
8. Disposal of excreta.
9. General sanitary condition.
10. Attitude of public scavenger.

Beginning at an arbitrarily fixed point, the same for each lot or parcel of ground, say the northeast corner, the exact location of the well or spring is found, its distance from the house, privy and out-buildings, as hog-pen, stables, etc., is noted and marked upon a map provided for the purpose.

In like manner points two and three are plotted, and when completed, the exact location and relation of each to each is found, and to the rest of the town or village. The topography of the land is then noted, for the following reason:

Let us suppose a house belonging to Mr. A upon one street or road, and one to Mr. B next, and Mr. C upon the next street or road, but abutting the two former at the rear. Mr. A's house is in a sanitary condition, his well or pump at his kitchen door, his privy is fifty feet to the rear, on oue side a stable and hog-pen. Mr. B's house is a counterpart of the other; his well is thirty feet from the house, and in a nearly direct line with Mr. A's out-buildings, and about three feet lower; his out-buildings are one hundred feet from the house. Mr. C's well on the other street is near his house, which slopes from the front to the rear and about one hundred feet from the privy in Mr. A's house.

A case of typhoid develops in B's and C's houses, the cause is hidden, it cannot be accounted for, the houses of both are in sanitary condition. Let us investigate; fecal bacteria from Mr. A's closet saturate the soil and find their way into Mr. B's well, which

is on a line and lower down; the surface washings from the hog-pen and stable run down the hill from Mr. A's to Mr. C's and infect his well; and so results two cases who are innocent sufferers, while Mr. A, the cause, escapes.

This is not a theoretical case, but the prototype of many, a case or two in evidence: Mr. T, living on the railroad, had a perfectly sanitary house and surroundings; his son contracted a severe case of typhoid, and after investigation it was found the privy of Mr. M, on the opposite side of the railroad cut, some fifty yards away, built off from the side of a hill, drained into a small gulley, which ran into a blind ditch, beneath the track, and ran on down the hill to a larger stream below, but passed within a few feet of the well about twenty feet from its surface opening, and had saturated the soil to such an extent as to pollute the well.

Mr. S, some twenty miles from the above site, built a summer home, and used the closet that had been used by the workmen. The water was obtained from a beautiful spring upon the other side of this hill, across the railroad cut; three cases developed in this family, one fatal; a quantity of crude carbolic acid, placed in the closet, in twenty-four hours made the water of the spring unfit to drink, showing that the fecal bacteria had made its way down the hill and into the spring.

Thus it is of the greatest importance to determine the location of every well, closet, privy, stable and hog-pen, not only upon a given piece of property, but on account of the topography of the land in its relation to others. A history of infectious or contagious diseases will give a clue to some unsanitary condition to be investigated and corrected.

The question of the disposal of excreta is one of the most vexatious with which town authorities have to deal. There are many methods of greater or less value, but all have some defects. The natural environment, of course, is an important element and must be considered as a foundation in every method.

The best method is the removal at stated periods of the contents of the privies, mixed with solution of sulphate of iron, lime, or permanaganate of potassium made into a compost and used as a fertilizer, which can be done cheaply and to great advantage both to the corporation and the farmer.

In many communities, the authorities have no power to employ a public scavenger, or if the power, no revenue to defray the expenses, each householder, by paying a small sum, say twenty-five cents per month, could enable the town to have a public scavenger.

The following points are recommended:

1. That the State Board of Health appoint a health officer in each county, to serve without compensation, who shall be the

executive representative of the State Board, and who shall be *ex-officio* president of the County Board of Health.

2. That the town councils or commissioners (corporate) shall nominate a local health officer, who shall be confirmed by the State Board, who shall be the local representative of said Board, and shall be a member of the County Board of Health.

3. A County Board of Health shall consist of the local health officer of every corporate town in a county, and he shall have charge of the sanitary conditions of said town and their adjacent territory, which shall be platted off, agreeably to such plans as the County Board may deem advisable.

4. These officers shall act in conjunction with town councils and the State Board, under such regulations as may be determined.

5. That every physician shall be required to isolate infectious and contagious patients and quarantine the premises.

6. That water-tight boxes be substituted for privies, cess-pools and earth closets.

7. That hog-pens be prohibited in corporate limits of towns or placed in a sanitary condition made water-tight, and elevated eighteen inches above the ground.

8. That all contents of privies be removed at stated periods by a public scavenger and made into fertilizer, as before noted.

9. That whenever a town council is incompetent to act, by reason or lack of authority granted by its charter, or for any other reason, the State Board authorize and empower its local representative or local health officer to act in the premises.

WHAT THE COUNTRY DOCTOR CAN DO TO PREVENT TYPHOID FEVER.

By August Stabler, M.D., Brighton, Md.

Far removed from boards of health, hospitals, dispensaries and drug stores, the country practitioner is the recognized guardian of public health, and, as John Randolph told Dr. Price, he must "take the responsibility and feel it." Removed also from the centers of clinical teaching and scientific research, he has not the many opportunities of refreshing his memory, renewing his courage, and receiving and applying new and interesting ideas and methods in his work. He has no time to make and watch bacterial cultures, and is too far from the laboratories where such work is done to rely on them for diagnosis. He must rely chiefly upon his own carefully trained senses and his theoretical and practical knowledge of disease to aid him in forming an opinion upon which may hang not only the life of an individual, but the health of a whole community.

The early correct diagnosis of each newly developed case of typhoid, and careful attention to disinfecting the excreta of the patient with some reliable germicide, such as formaldehyde, must result in largely preventing the multiplication of the bacilli. If, in addition to disinfecting the excreta, the patient has a sponge bath once or twice daily, followed by a little formalin sprinkled or sprayed on the sheets and clothing of the patient, and cleanliness and good ventilation be insisted upon, the risk of directly infecting those in attendance will be reduced to a minimum. Of course, if the patient has diarrhoea or involuntary evacuation, additional precautions must be taken to immediately disinfect all soiled clothing, and to disinfect the hands of the nurse after touching soiled clothes.

Next, the water supply must be looked after. If the source be a spring it should be thoroughly cleaned, disinfected with lime or potassium permanganate and efficient drains be cut so that no surface or storm water can flow into the basin. If the water of a well is used for drinking or washing, enough permanganate should be thrown into the well to render the water pink for twelve hours. The quantity required will be from one and a half to eight ounces, varying with the quantity of water and the amount of organic matter present.

When the water is low in the well, the quantity required will not be so great, unless the proportion of organic matter be relatively greater. This practice can be more efficiently carried out under the eye of the doctor than boiling the water, which ignorant people will seldom continue for any length of time. Dr. Cameron, Health Officer for Galloway, Scotland, contributes an article that throws much light upon the ever present question of well water. He says: "It is the practice or fashion now to disparage shallow wells as being *de facto* and inevitably liable to pollution; but we know enough of the distribution and functions of the nitrifying bacteria in the upper layers of the soil to see that if by a proper curb, cover, etc., storm waters and surface filth are excluded, all legitimate additions of manure and other organic matters to the surrounding surfaee soil will be completely mineralized long before they can reach the ground water.

"It would be impossible, if it were desirable, to abolish shallow wells; but there is no excuse for the retention of that abomination, the cess-pit, which, by discharging through leakage or otherwise putrid liquids into the earth at a depth below the bacterial, or 'living' zone, is the cause of the pollution not only of most shallow, but of many deep wells, since no amount of percolation through the 'dead' earth suffices for real purification. The 'living' earth is the best of all possible filters, and with the abolition of cess-pits and the direct application of excreta to the soil and the discontinuance of the practice of accumulating dung

in heaps till the underlying soil is supersaturated with reeking filth, a properly constructed well, even of but six or eight feet in depth, should be practically free from the least risk. Wells are indeed the natural sources of water for human use, and it is only human perversity that has marred their fair fame."

The physician has it in his power to insist that all suspected wells be disinfected and that all cess-pits and heaps of dung in the proximity of wells be removed. While insisting upon this he should explain that the action is for the benefit of those who have not yet contracted the fever, but may be infected by the water, and that all who are in the habit of using the water should join in bearing the necessary expense.

The lawyer gives his opinion and counsel, the city physician advises and prescribes for the sick, but the country doctor's word is law and, if competent and earnest, his commands will usually be obeyed, though it will often require vigorous language to overcome the inertia of the popular mind.

DISCUSSION.

Dr. Fulton: It is now nearly half past ten o'clock, and I think the Conference will be better served by the omission of my illustration. The gist of what I had to say is expressed in the charts which are suspended before you. The Chairman, Dr. McShane, is of the same mind with respect to his own paper. I trust some one will move that we go now to the work of permanent organization.

Dr. McShane: What is the will of the Conference? Much remains to be done before adjournment, and I believe something of interest will occur down stairs after adjournment. In the absence of any motion, I take it to be your pleasure that we shall proceed at once to effect a permanent organization.

Dr. L. G. Smart: I move that a committee of seven be appointed as a nominating committee to select permanent officers for the organization. The motion was seconded by Drs. Stokes and Councell and adopted. The Chair appointed Dr. L. G. Smart, Dr. W. R. Stokes. Dr. A. W. Clement, Dr. W. M. Lewis, Dr. Wm. Osler, Dr. Philip Briscoe and Dr. G. H. Rohe.

Dr. Schaeffer offered the following resolution:

Resolved, That the health officers of the State of Maryland, in open conference, hereby extend their moral support and best wishes to the Burgess and Commissioners of New Windsor, Md., in their battle for municipal cleanliness.

The resolution was seconded and adopted.

Prof. Penniman: As many of us are not members of the Faculty and as the use of these rooms has been so kindly put at our disposal, I move that a resolution of thanks be extended to the Faculty for the use of their hall and that the resolution be

extended through our Secretary, Dr. Fulton. The motion was adopted.

Dr. Councell: I move you that a vote of thanks be extended to the members of the Faculty of the Baltimore Medical College and of the College of Physicians and Surgeons, expressing our appreciation of their kindness and attention to us during this conference.

Dr. Fulton presented a resolution of thanks to the Press of Baltimore.

The Committee on Organization submitted the following recommendations:

First, that the Association be called the Maryland Public Health Association.

Second, that it will hold two meetings a year.

Third, that the following officers be elected for a service of one year.

President, Dr. W. H. Welch, Baltimore; Vice-Presidents: Hon. Charles T. Westcott, Chestertown; Mr. H. G. Weimer, Cumberland; Mr. Charles Hartshorne, Brighton; Dr. Philip Briscoe, Island Creek; and Mr. Henry Brauns, Baltimore; Secretary, Dr. John S. Fulton, Baltimore; Treasurer, Dr. L. G. Smart, Roland Park. The report was adopted as a whole.

The Committee on Resolutions reported through its chairman, Dr. J. McPherson Scott, the following preambles and resolutions, which were adopted.

Whereas, The health of towns is admittedly exposed to great injury from the contamination of water used for household purposes, and whereas the proper supervision of water supply in this State will require the continuous services of a chemist and a bacteriologist, and the occasional services of an engineer: Therefore be it

Resolved, That this conference shall, through its committee on legislation, petition the next Legislature to place the supervision and control of the water supply in the hands of the State Board of Health, and that an appropriation of a sufficient sum of money be asked for the equipment and maintenance of a State chemical and bacteriological laboratory.

Whereas, The conference believes with one mind that an effective vital statistics law furnishes the index of, and is a guide to material and moral progress; and whereas the regulation of burials by law is the key to complete registration of death, a check upon crime, and a preventive of disease; and whereas the registration of births affirms both the interest of the State and the allegiance of the citizen, and secures the personal and property rights of the citizen; and whereas the compulsory notification of infectious diseases conserves alike the interests of the individual and the commonwealth: It is therefore

Resolved, That the President of this Conference shall appoint a committee on legislation, consisting of one from each county and one from each legislative district of Baltimore city, who shall prepare and present to the next Legislature, a bill for the collection and registration of vital statistics, a burial law, and an infectious disease notification act.

WHEREAS, The interests of public health demand the centralization of authority in sanitary matters; and whereas the organization of local boards of health is important to the State no less than to the locality: Be it

Resolved, That the committee on legislation be instructed to formulate a plan by which such organization of sanitary authorities throughout the State may be best secured.

DR. WILLIAM J. TODD offered the following resolutions which were referred to the committee on legislation of the new Association:

That the State Board of Health be requested to secure the proper legislation granting the several boards of county commissioners power to appoint one regular physician in each electoral district, whose duty will be to have charge of the general health and sanitation of the different schools in his district.

That he vaccinate all children and teachers in such schools as may, in judgment require vaccination, and that the necessary vaccine matter be considered a part of, and be supplied as now are the usual school supplies.

That no child recovering from a contagious disease be readmitted to the public schools until thirty days have elapsed after convalescence; that this rule apply to all children in each household where a contagious disease has manifested itself, the certificate to be given by the attending physician.

That a special appropriation be made by the county commissioners to defray the necessary expense of this act, and that the present appropriation of school funds be in no way lessened or abated by the legislation asked for.

DR. JAS. H. MCCORMICK offered the following resolutions which were referred to the committee on legislation:

That the State Board of Health appoint a health officer, to serve without compensation, who shall be ex-officio president of the county board of health.

That the town councils or corporate commissioners shall nominate a local health officer, who shall be the local representative of said board and shall be a member of the county board of health.

A county board of health shall consist of the local health officers of every corporate town in a county, and shall have charge of the sanitary conditions of said town and the adjacent territory, which shall be plotted off agreeably to such plans as the county board may deem advisable.

These officers shall act in conjunction with the town councils and State Board.

That every physician shall be required to isolate infectious and contagious patients and quarantine the premises.

That water.tight boxes be substituted for privies, cesspools, and earth closets.

That hog-pens be prohibited in the corporate limits of towns, or placed in a sanitary condition made water-tight, and elevated eighteen inches above the ground.

That all contents of privies be removed at stated periods by a public scavenger and made into fertilizer.

That whenever a town council is incompetent to act by reason of lack of authority granted by its charter, or for any other reason, the State Board can authorize and empower its local representative or local health officer to act in the premises.

The Conference then adjourned *sine die*.

FIRST SEMI-ANNUAL MEETING

OF THE

MARYLAND PUBLIC HEALTH ASSOCIATION.

HALL OF THE MEDICAL AND CHIRURGICAL FACULTY,

BALTIMORE, *November 18, 1897.*

The meeting was called to order at 2.15 P. M. by the President, Dr. William H. Welch, who said:

It was undoubtedly a very happy inspiration that led to the organization of this association last spring You are doubtless all familiar with the history of our meeting in February, which was due very largely to the efforts of the Secretary of the State Board of Health and the Chairman of the Committee on General Sanitation of the Medical and Chirurgical Faculty of the State of Maryland, and you know that the enthusiasm then manifested led to a permanent organization, which we believe is destined to be of very great benefit to the State of Maryland and to the City of Baltimore. One of its advantages is that it enlists the activity and interest not only of medical men, but also of those who are not physicians. It is true that the impulse towards State sanitation has come, and should come, from medical men. Hippocrates said very truly that the investigation of disease should include the study of the air and water, of places and the quality and quantity of food used. Medical men have done this and they have taken a very prominent part in the advances of hygiene in modern times. In reading a report of a committee appointed by the State of Massachusetts in 1849 on this subject, I was impressed by the fact that those who signed the report were all laymen. I would like to read a quotation from that report, in order to emphasize the fact that those who had such true and comprehensive views of hygiene, were not medical men. They introduce their statement with the following words:

"We believe that the conditions of perfect health, either public or personal, are seldom or never attained, though attainable; that the average length of human life may be very much extended, and its physical power greatly augmented; that in every year, within this Commonwealth, thousand of lives are lost which might have been saved; that tens of thousands of cases of sickness occur which might have been prevented; that a vast amount of unnecessarily impaired health and physical debility exists among those not actually confined by sickness; that these preventable evils require an enormous expenditure and loss of

money, and impose upon the people unnumbered and immeasurable calamities, pecuniary, social, physical, mental and moral, which might be avoided; that means exists within our reach for their mitigation or removal; and that measures for prevention will effect infinitely more than remedies for the cure of disease."

The three commissioners who made this report were Lemuel Shattuck, Nathaniel P. Banks and Jehiel Abbott. Not one of them was a physician.

A very great advantage of this association is that it will bring together local and general health authorities, and so secure co-ordination and uniformity in the exercise of their powers. It is well known that within recent years matters of public sanitation have engaged the attention of statesmen in an increasing degree, so that now, matters of public health enter into municipal politics as we can see in nearly every campaign.

The education of the public is one of the most important, I should say the most important, functions of this association. Matters relating to public health are not as mysterious as the public generally believe. They are easy of comprehension and should be well and widely known, as it is only when the laws relating to public health are supported by an intelligent public opinion that they can accomplish the results for which they are designed.

One matter which was prominent in the meeting of last spring is not on the programe now, but I would like to refer briefly to the importance of securing a satisfactory registration of vital statistics. An intelligent statement as to the cause of every death in the community is absolutely essential, as a basis of proper sanitary legislation. These statements must come from medical men, and are controlled from beginning to end by medical men. It was only after such registration begun in England, by the law of 1837, that there was demonstrated any satisfactory scientific basis for public hygiene. Without the knowledge that can be obtained by systematic registration of the number and causes of death, our ideas as to the causes of, and means of preventing, disease are matters of pure speculation, and even physicians must differ as to these phenomena; but in faithful records of vital statistics we have facts susceptible of proof, and with such knowledge we can secure satisfactory laws. It is on this basis therefore that public hygiene must develop.

Our programe seems to me to be a very attractive one. It has been arranged rather easily on account of the great interest taken in the questions with which this association is chiefly concerned.

As you will observe we have made a special feature for to-morrow—the subject of school hygiene; and for the evening, a subject of timely interest to the city of Baltimore—disposal of

sewage. We have also made a special question of the relation of slaughter houses to human disease, and disinfection comes in for consideration. We will begin at once with the programe. Matters of business will be brought before the Executive Session tomorrow morning.

SANITARY ORDINANCES; POST-MORTEM.

By Howard Bratton, M. D.,

Health Officers of Cecil County, Maryland.

The usage of modern society demands more or less familiarity with sanitary principles and methods. The advancement of the pure science is rapid; its practical application lags. This is particularly true of the rural districts and towns.

It may be one excuse for the failure of the public to grasp and turn to advantage the well-attested truths of sanitation, that they have never been put before it in a correlated way. The first and only lessons have been served upon it by statute and ordinance. Any attempt to invoke the aid of the strong arm of the law to force half pursuaded people will meet with obstinacy and resistance. It is easier to lead than it is to drive. You can not secure cleanliness by legislative enactment any more than you can secure morality and temperance by law. Good citizenship may be proven so far as the law prescribes, and its exponent be no better than an Ishmaelite.

Again, the diverse opinions and conclusions of scientists and sanitarians, to say nothing of the disagreements of doctors, are responsible for not a little of the indifference abroad in the land. It is openly charged (and with good reason, too) that the kind and extent of testimony produced by medical experts are limited only by your ability and willingness to pay for it. In the recent celebrated Chicago case, the prosecution had less trouble in proving a skeleton in the closet than the arbiters had in determining what kind of a skeleton it was in the vat. Such a circumstance as this, or the slightest variation in the results of more occult things, beget an unconcern regarding less hidden dangers at the very door, and causes the populace to look askant at the meandering trail of these blind leaders of the blind.

In the third place, the widespread and misdirected dissemination of the latest knowledge has resulted in an overtraining. A town which, for financial or topographical considerations, is unable to introduce the best equipped sewerage system, is loath to adopt any system at all and follows customs, which, if less primitive, are more deadly than those of the cave dwellers. The education has begun at the wrong end. They would be much better off if

they had never heard of a sewer, if present necessities are to be neglected in the hope of embracing better opportunities that may never come.

At a private discussion in regard to the public health it was suggested that for a burial in the cemetery a permit should be required. Another declared that no burial should be allowed in this particular cemetery, at all, it being within the town limits. When a third party contended that cremation was the only proper means of disposal of the dead, the whole subject was summarily dismissed as too horrible for even contemplation. Cremation will not be practiced, interments will continue to be made in the town limits because "them sanitary fellers are after us, dead or alive!"

By legislative authority delegated, the town councils have passed ordinances for the protection of the public health. This is a sample—"Any person or persons who shall cause or permit any pigsty, privy, sink, or cesspool under his, her, or their control to become offensive to the neighborhood, shall pay a fine, etc." Another ordinance requires a complaint to be made to the bailiff or a commissioner. Before it becomes offensive to the neighborhood or sufficiently vile for a complaint to be lodged with the bailiff, it has dealt disease and mayhap death to some household. If it contemplates suppression as a nuisance, prejudicial to comfort solely so far as odor is concerned, then the town has in them no health ordinance whatsoever.

It is a fair presumption that these ordinances were enacted for the benefit of the public health. They are a concession and a confession of the need of something in this line. But as such they are radically defective. They should look to the prevention of disease and provide for precautionary measures and safeguards, "first, last and all the time." They may be of some use, it is true, and a rigid practical application may preclude other cases; but any community is behind the times which depends upon a regulation powerless to do its full measure of good by making both healthfulness and prevention secondary and not primary considerations. They are post-mortem ordinances.

According to the State law, a certificate is required from three or more persons affected thereby that a nuisance is dangerous to health. It is allowed to continue dangerous to health, for how long it is not determined, before any means for redress become operable.

In this State the pollution of a public water supply is heavily penalized, if it be rendered foul and unfit for drinking and domestic purposes. Doubtless the act contemplates the prohibition of the slightest amount of contamination, but nevertheless an intolerable and dangerous degree of foulness would have to be proven before any fine would or could be imposed. The

interpretation of the common law is dependent upon the decisions of different interpreters and is consequently conflicting.

It is generally admitted that the natural volume and purity of the water should not be interfered with, unless a prescriptive right of twenty years' continuous offending grants this privilege. Since this is so, the same privilege should be freely accorded to every other class of criminal offenders. But if disease and death has been caused thereby, and you can prove the same to the satisfaction of the court, the nuisance may be interdicted and damages awarded. But nothing short of the killing of a dozen or so of people is likely to attract any attention.

A report of the town of Elkton is here introduced to illustrate the indifference and apathy of the people and the effects of deficient sanitary laws.

Although there are no statistics on the subject it can be shown that in the town of some 2600 inhabitants there were at least 35 deaths, and that 14 or more of these were due to infectious diseases for the year prior to July 1, 1897. In July, August, September and October, 1897, there were 17 deaths, and 10 were due to infection—3 cases of pulmonary tuberculosis, 2 of tubercular meningitis, 1 of tubercular peritonitis, 1 of diphtheria, 1 of pneumonia, 1 of typhoid fever, and 1 of tetanus in a stout boy of 17, with no history of traumatism, but of having lain in a perspiring state upon damp and foul ground.

The little white hearse leads far too many processions through the streets and religious consolation is proferred in the mysteries of providence; but, if there is one thing above another which indicates a dearth of true religion and a lack of common discrimination, it is this eternal mixing of ways providential and agencies pestilential.

One promise is invariably heard and no lesson is taken therefrom. "The years of a man's life are threescore years and ten." If there is any preference either way, it is toward fourscore years, and, if he reaches not the limit entailed by Holy Writ, there is something materially wrong in his inheritance, his habits or his environment.

It is contended that Elkton is no more unhealthy than it used to be; this is freely granted, even to those who do not want to see that if offers less excuse for the disgraceful continuance. It has been asserted that it is no more unhealthy than other places. It proves nothing, teaches nothing, and gives no consolation to intelligent minds to compare Elkton to other filth-burdened towns, whether they live in spite of it, or die on account of it. The point is this: Some one has fallen short of his duty here if we suffer loss by one preventable death!

Part of the difficulty consists in insufficient drainage. The greater portion of the ground is naturally damp, and there are

many low places from which the water has no egress except through the ground, and this continues in spite of excellent natural drainage. The accumulated filth of years is polluting the soil, the air above and the water beneath. As for diseases, they have everything advertised in the bills. On account of the dampness, respiratory diseases are frequent and fatal.

Some three years ago there was an extensive epidemic of pneumonia with the usual rate of 1 in 4 for the epidemic form of this disease. Tuberculosis is prevalent, as the record shows, and to this the dampness contributes. Squire, of London, investigating heredity, traced the progeny rather than the ancestry of consumptives and found a difference of but 9 per cent. He claims that it is a question of infection rather than inheritance; the victim inherits a lack of resistance to any disease. "Such a person living with a consumptive (it may be a parent) is likely to become consumptive, not because of any specific tendency, but being constitutionally non-resistant he contracts the disease, the infection to which he is exposed, and in this case it is tuberculosis."

The necessity of surface cleansing is reflected in the analysis of the drinking water. Three samples supposed to be bad contained in the aggregate 640 parts of chlorine when it should not exceed 18, and 70.53 parts of nitrates when it should not exceed 15, and nitrites from a trace to considerable. Three samples supposed to be good showed 86 parts of chlorine and nitrites very abundant. There was nearly a score of cases of typhoid fever in 1896, and three deaths. Dysentery and diarrheal diseases are frequent.

The diseases, whose germs particularly flourish and multiply in collections of organic waste are, like the poor, always with us. Diphtheria has not been absent from the town for any length of time during the last two years. Of some probably 50 cases there have been but two deaths. And of all these diseases, 9 cases out of 10 will be found in the outskirts and filthy portions of the town where they may reasonably be expected to be found.

The functions of a health board seem to be not operative unless some unusual sickness or mortality prevails. What would be unusual in Elkton would puzzle the prince of necromancers to decide. In the meantime the health board encounters the ragged end of an injunction.

From Sternberg, who stands at the top, to the framer of town ordinances, who stands at the bottom of sanitary authorities, it is universally agreed that certain diseases are contagious from person to person. If the average Elktonian inadvertently gets into a house where there is diphtheria or scarlet fever, you need not organize a society help him get out. Like the priest and the Levite, he will, thereafter, go by on the other side

of the street. Note the inconsistency—if he believes this, why is it so hard to make him believe that the abominations in his own back yard are likely to become sources of infection?

The hog as a poor man's savings bank is a delusion and a fraud. If you cannot teach a man economy and thrift, except through the medium of husks for swine, you cannot make him keep his premises clean. During the past summer, the surroundings became so infernally bad, that 50 per cent. of these penned-up unfortunates died. This, at last, threatens to dethrone him as the most potent factor in municipal politics.

Since legislation is intolerable to the masses, and invariably fails, even when it has preponderating public sentiment on its side, some other means of escape must be devised. For any real relief the measnres must be instructive rather than punitive. We must educate the individual, for a diseased public mind is dependent upon aberrations of the individual mind. Nor is it wise to attempt to do too much at one time.

It is one of the duties of the medical profession to educate the public on matters of disease causation. By constantly hammering on the subject of infection, with the object lesson before the class, we can secure the adoption of prophylactic measures indoors and out, where now carelessness and ignorance are the rule rather than exception.

The more systematic study of hygiene and sanitary science in educational institutions has at least the advantage of an early start. Instruction, first in the fundamental principles of cleanliness, ventilation, drainage, house building, town building and the more practical fields of fixed knowledge. At a later period the question of unsightly structures, unhealthy surroundings and immorality may be discussed in the light of Nature, beautiful and undefiled, except as man defiles her, and let the professor of esthetics determine how closely esthetic defects and moral defects are interpendent.

Among sociologists, the negro population is deserving of more study than it receives. Unclean, unhealthy and immoral; half-fed, half-clad, overcrowded and neglected; comparatively unrestrained by written law and social custom; devout followers of the motto on Maryland's shield, a growing enmity and distrust of the whites—these are characteristics which, if unchecked, are certain to produce, sooner or later, disastrous results. An unhealthy town is generally, if not necessarily, an immoral town.

Popular education may also be greatly furthered by the members of public health associations, by individual effort, and lectures upon the subject. The Woman's Health Association of Philadelphia reports favorably on the distribution of opportune and pertinent literature.

Speaking particularly of country districts, the best means to this end is a record of vital statistics. In 1865. in Cecil County, a record was started in the office of the clerk of the Court in a large book prepared for the purpose. It contains less than a score of deaths. This is the only good post-mortem ordinance that we have, and it is allowed to become a dead letter. Where the number of deaths in a given time is unknown in a given population, there is no chance to compare one section or one period of time with another, or to determine whether we are getting better or worse. There is lacking not only the foundation for an effective health department, but the principal means of attracting and holding the attention of the public.

Finally, in the rush after theoretical knowledge, it is fitting to pause once in a while to consider the best means of diffusing this knowledge among the parties most concerned, for the axioms of modern sanitation mean naught if not evidenced in practical and beneficent results.

DISCUSSION.

Dr. John Morris: Our author has wisely and truthfully said it is wise not to do too much at one time, and that maxim was never carried out better anywhere than in the town of Elkton. About twelve or fifteen years ago, I went there as an agent of the State Board of Health to investigate an outbreak of diphtheria. I saw that there was no drainage and no scientific means to get rid of the sewage of the town. I warned these people at the time, through the public papers, that they were in danger of epidemics. Your Press, Dr. Bratton, abused me for this report; your people have done nothing since. Why don't you, sir, organize and educate these people; you can do it, a strong man like you. That has been much of the trouble; there is no one strong man who will warn the people of their danger.

Dr. Wm. Lee: It has been my pleasure to go to Elkton often, and I have seen the good work that Dr. Bratton is trying to perform there. He is doing all that can be done with the unreasonable people he has to deal with. One of the troubles is to get the people properly educated. This requires much time, and it requires the organization of a Board with full authority; and then with proper laws, as Dr. Bratton says, there is no doubt that the people will get together and do whatever is necessary for the town. Elkton is a peculiar town and has many disadvantages that do not exist in other towns; it is very flat and has no natural drainage. I do not think, that if you should go there for a visit, that you would wonder much at the extreme unhealthiness under the present sanitary laws of the State of Maryland.

Dr. Bratton: We have the facilities for natural drainage if they were properly used, as we are 15 or 20 feet above the water level.

Dr. Lee: It would cost a great deal though, would it not, to secure such drainage?

Dr. Bratton. No, I think not.

REPORT UPON THE CAUSES OF TYPHOID FEVER FROM RECENT EXPERIENCES IN BALTIMORE COUNTY.

By Purnell F. Sappington, M. D.,

Health Officer of Baltimore County.

In speaking to an audience on a subject about which they know as much, if not more, than the speaker, he should obtain its pardon for his temerity before proceeding. I therefore crave yours for my few words and trust forgiveness, not only for them, but also for the time I shall consume, and the poor way I am able to present so important a matter.

After the perusal of the programme I thought of asking to be excused from reading my paper, when I saw subjects so nearly allied, treated by men so much abler to speak, not only instructively, but also authoritatively. In compliance with our Secretary's request, however, I venture to inflict on you the subject assigned.

Typhoid fever is a water disease, caused generally by infected water, treated best with cold water, and prevented by the application of boiling water to the discharges from the patient. The water-supply of no neighborhood is free from suspected contamination if this disease appears, and the position of the well and its distance from the sources of infection, largely influenced by the character of the soil, should be considered. This applies with equal force to springs, those in particular which are situated in valley or on hillside below the seat of disease.

The closeness of the wells to the house may be a great convenience to the housekeeper, but it is to be condemned from every other standpoint, convenience being the only thing in its favor. Water supplies close to dwellings are almost always polluted by animal or vegetable decomposition products.

This was found to be the case in the recent epidemic at Chase and Middle River, where the springs and wells are with few exceptions badly located. The bacteriological examination of the well and spring water from these two points will verify the assertion. I here read the report of samples taken from this vicinity.

Dr. John S. Fulton,

Secretary State Board of Health.

Dear Sir :—I respectfully submit my report upon the bacteriological examination of the wells and spring waters from Chase, collected on Friday, October 15, 1897. Sample No. 1, spring near house of Draayer family. Water clear; no odor; microscopical sediment negative. Five cubic centimeters were introduced into fermentation tubes and the subsequent reaction was typical of the bacillus coli communis.

Sample No. 2, spring further from house of Draayer family. The sides of the barrel of this spring were covered with a greenish, shreddy deposit. This under the microscope was seen to consist of microscopical animalculae of the class of infusoria called paramecium and monads. These organisms are usually found in polluted water. The bacillus coli communis present in 5 c. c. of water.

Sample No 3, Harris well. No bacillus coli communis in 5 c. c. of water. Microscopical sediment negative.

The presence of the bacilli coli communis in the first two samples, furnishing the water supply to a family in which three persons were suffering from typhoid fever, is interesting, since it shows the presence of intestinal deposits in the water. This, in connection with the fact that faecal drainage could enter either of the springs, certainly furnishes the most reasonable explanation of the cause of the typhoid fever. Very respectfully,

Wm. Royal Stokes, M. D.

All sanitarians recognize that the finding of fecal organisms in water renders it unfit for use, yet the hands of those connected with the boards of health of this State are tied under present laws, even when fully convinced such is the case; but I am proud to say that we have here in our midst a man who locked wells which he believed so infected, not taking into consideration anything save the good he was doing. It has long been an open secret that the neighborhood of Chase and Middle river is a hot-bed for zymo-pathogenic affections, and this surely is reason for the inhabitants to use all precautions to keep their properties in such condition that they may not, by their neglect or indifference, contribute to the spread of these diseases.

The healthfulness of this portion of the county can certainly be much improved by a few simple precautions and the mortality greatly reduced. It is an easy thing to drain a puddle of stagnant water, to keep a stable, a pigpen and privy clean. It is also economical to do so. Not to comply with the simple measures is to open the way and bid welcome to the dreaded disease which has taken off some of the best residents and left sadness and mourning in so many households. The vicinity of Chase is

a rolling country, dotted by many springs, streams and a number of insignificant tributaries of the bay, with their accompanying marshes and swamps. These points taken into consideration make it no wonder that miasmatic contagious diseases so frequently infest the neighborhood, and when in addition the wells, their closeness to privies, pigpens and stables are taken into consideration, one can but be surprised that diseases of this character are not more devastating in their results.

Whether these conditions are more favorable to the development of the disease than the carelessness of the physician to its spread is a question of no small moment, and should cause a pause for their consideration. Let every physician treat every fever suspect as if it were typhoid, exactly as he does and should treat any membranous throat as diphtheria until convinced to the contrary. Had proper precautions been taken in the Plymouth, Pa., epidemic of 1885, that town would not have had such objectionable prominence thrust on it. With what force the thinking man is struck as to the woeful neglect there committed; how little he takes to himself the necessity of avoiding the same is shown by the number of cases in a neighborhood treated by the same individual and for which he himself at times is clearly responsible.

Unfortunately, some practitioners of the State are unwilling to say a case is typhoid upon which they have pronounced otherwise at the onset, and rather than acknowledge their mistake, give absolutely no instructions as to the disinfection of the dejecta. This, to some of you, may seem satirical, but it is true, and on more than one occasion has my attention been called to this condition by rivalry between physicians practicing in the same neighborhood. Not only is this ignorance or indifference with physicians, but also with the laity. In examining the surroundings of a house in which three were sick with typhoid, the pig-pen was inspected, and found to be filthy in the extreme. On telling the owner to clean it, he asked in open mouth astonishment: "Doctor, what's the matter with them pigs?"

Typhoid fever being a disease caused by impure water and air, needs for its treatment pure water and air. We may well understand how the germ may be transmitted by the air, especially when we take into consideration the nature of facultative aerobics. Milk enters largely as an etiological element in that it is used so largely as a diet in this disease, and one should be sure that it is of such quality as not to be feeding the patient with the disease we are trying to get rid of. Any doubt as to its contamination should exclude its use, giving the patient and not the milk the benefit of the doubt. Vegetables are frequently infected by being grown on soil fertilized by night soil, or watered by liquid manure, the common practice on some of our trucking farms.

Vegetables should not be allowed to be sold that are taken from a soil polluted as mentioned, and the same law should apply to these as to milk from infected cows or diseased flesh.

The part taken by the temperature, rainfall and humidity has long been recognized as having a strong influence on the disease from an etiological standpoint. That "science moves but slowly" is verified by the fact that all sanitarians have done has not been enough to wipe out the abomination of abominations, the cesspool. Words fail to express the great amount of harm these horrible pestilential nuisances accomplish, and I hesitate to enter on the subject, as my paper would cover too much time. A careful examination of the cesspools and privies in the county show a most distressing laxity in the way they are cared for, and an utter disregard of the importance of careful attention, so necessary from a hygienic point. Privies and cesspools should not be allowed that are not water-tight and they should not be used as catch-alls for poultry refuse and other household offal as so frequently they are. It is impossible to say how much sickness has been caused by these two agents, and the 20th century should see their complete abolishment. The pail system and dry system are the best for country use and when properly managed are not dangerous.

Ice taken from ponds which are generally nothing but the accumulation of drainage of the land, contaminated by one or all of the above filth articles, is another prolific cause of the disease, and the idea that all things are killed by freezing must be corrected.

To sum up then, we recognize that this disease does not originate *de novo;* that the excreta from a single patient are enough to poison a whole community; a large percentage of the mortality is due to improper diet and too much medicine; that the bacillus is not to bear all the blame, but that a share is to be thrown on the pollution of the water and soil and air, brought about by, I need only call it, criminal negligence of the medical attendant, in allowing the dejecta of his typhoid fever patient to be carelessly disposed of without taking pains to be sure of the safe disposal of the germ-bearing material, and failing to constantly preach that cleanliness is a poor man's wealth.

POLLUTION OF SOIL AND WATER.

By John S. Fulton, M. D.

Secretary of the State Board of Health.

Some years ago in England a man buried a barrel of petroleum in his orchard. The results of the interment astonished the

community, for in a short time he and most of his neighbors had to abandon their wells. A series of wells averaging 60 feet in depth, and some as far away as 900 feet, were so affected by the diffusion of the coal oil, that even cattle would not drink the water. Very likely this man had, within 100 feet or so of his well, a stable, pigsty and privy, while each of his neighbors possessed similar "conveniences." After the coal oil was gone, they all no doubt returned to their former water supplies, without any further reflection than that coal oil is very searching stuff.

In some parts of Maryland 90 per cent. of the private wells are found chemically unfit for use. In other places a less proportion are contaminated, but in no community where systematic examinations have been made are as many as half the wells free from organic pollution.

When these facts are stated, persons unfamiliar with the subject are apt to reflect: "The danger must be small or every one would be sick. How can any one escape?" The reply is: Of those who die, most perish through the fault of man; of those who escape, all are saved by the providence of God. If the misuse which man makes of what he calls his land were permitted to work out its logical conclusion, the race would be extinguished. Man stupidly and persistently pours into his land as many as he has of the ingredients of a fatal prescription. Luckily, he is apt to lack the one thing necessary to complete the poison. When he possesses the deadly germ he flings it with the rest into the ground and feels no concern as to results.

The consequences, frightful though they may be, are more merciful than his conduct. He scatters like a prodigal the seeds of death, but our kind mother refuses the crop. He befouls the earth wherever he goes, but the sunlight, air, rain and countless hosts of living things are constantly busy cleaning up after him. It is only when he supplies more and worse dirt than these combined agencies can remove that outraged nature exacts the extreme penalty.

The amount of scavenging accomplished by these silent, ceaseless forces is incalculable. Chemical examinations of the soil around and beneath old vaults show in some instances that within a surprisingly short distance the soil is practically pure. Vidal and others poured quantities of pathogenic germs upon the earth at Grenvillier, and found that they rapidly perished. The bacteria of the soil are as a rule confined to a zone of from a meter to a meter and a half deep. The organisms of the upper earth are mortal enemies of the disease bacteria. Direct sunlight is fatal to many species of bacteria. Drying kills many germs, while others are borne to destruction as dust in the air currents. Only a few harmful organisms, mainly those bearing spores, are able to withstand sunshine and dessication. The

ordinary bacteria of water are hostile to the disease bacteria. These are a few of the influences which have helped man to increase upon the earth in spite of his dirty habits.

If human life were cheap, we might continue to accept all this beneficence without gratitude and indulge our selfishness without remorse. But human life is not cheap, and nature justly illustrates both the value and the responsibility of life by now and then taking toll from the choicest of our flocks. Her means to this end are as simple and orderly as those by which she defends us, but they are not inexorable.

Having learned in part how the many are saved, let us see how the few perish.

The breeze, which disperses a myriad dried and inert plants, may drop a few into soil fitted for their renewed activity. The sun, whose rays shrivelled millions, warms hundreds into growth, and releases other hundreds from the clutch of frost. The rain, which buries some in the inhospitable depths of earth or sea, gives living drink to a parched few and trickles others into your well, supplying at the same time the nitrogen upon which they feed.

So the things which you have provided for your safety and comfort may become means to quite opposite ends. You have not appreciated the limits of your ownership and mastery of the land on which you dwell. Half of it is water and the water is not yours. The well which seems your very own is yours only for a day. You have merely a riparian interest in an underground stream subject to the equal rights of your neighbors upon either side. It is really a stream pursuing its course with measurable velocity to the sea. The heavens poured it upon the soil, which man and beast alike defile, and the patient earth has cleaned it for use. You have destroyed its subterranean character by impounding a part of it as a surface pool; for the perpendicular sides of the well, no matter how deep, are not the depths of the earth, but a deflection of its surface, bearing a zone of organic life, but little different from that of level ground.

You have also constructed a vertical drain, affecting so wide an area, that it is worth while to be informed what other things than water are within its influence. A well draws from an area having somewhat the shape of an inverted cone. How long its radius at the base may be is indicated by the coal oil incident.

Experiments have been made to determine the deeper radii, and it has been found that the angle of the drainage cone varies with the character of the soil and the rate of pumping. In fine sand, to pump out a foot of water depresses another well in the same stratum at a distance of 20 feet. In fine gravel, to pump out one foot affects a well 22 feet away. In chalk, one foot depression is felt at 57 feet; in sandstone, at 143 feet; and in coarse gravel at 160 feet.

If waterlevels are disturbed at such great distances, then the drainage area must be much wider at the surface than the coal oil incident would indicate. That observation shows that upon such soil nine wells would drain a square mile.

A certain Baltimore brewer, who tired of buying water at meter rates, sank an artesian well, securing a fine flow. Another brewer, inspired by the neighbor's success, drove a pipe to the same depth. The first brewer's water disappeared, never to return.

These observations all go to show that among a series of wells there are oscillations of current in the common water-supply, the direction of the stream being deflected towards one well or another as each in turn is used. If A uses 200 gallons in the morning, he gets part of the water from B's well one hundred feet away. In the afternoon B pumps 200 gallons, A's well being drawn upon for part of that amount. If a fire breaks out, A's pump may be run at such a rate as to exhaust both his own and B's well. Instances of this sort are common.

In our suburban communities, what a sweet intimacy is this promiscuous use of a common water supply.

As the well is filled by draining from every direction, so from the points of deposit, human waste is dispersed in every direction. It is customary to set apart two or three spots for the collection of these matters, but it is questionable whether in many instances the soil is not more widely polluted than it would be by indiscriminate distribution. Where deposit on the surface is practiced, ordinary care being used to prevent undue accumulation, the area of impure soil is usually neither wide nor deep.

Under favorable conditions the bacteria in the surface soil do all the necessary purifying. Sometimes even under unfavorable circumstances, as under and around long used vaults, the pollution of soil has been found to extend not further than six or seven feet. This must not be taken as a general rule, however, for there is a saturation point for all soils, and as the bacteria, like other plants, have their seasons, the saturation point is variable.

The barriers may easily be passed, and when this occurs soluble impurities will sink through the soil in ever widening circles.

The area of pollution has a conical shape, base down. The width of the angle of pollution will depend upon the nature of the soil, and upon its humidity. A wet soil diffuses chemical impurities widely. In a dry soil they sink more deeply. Impervious strata may conduct foul matter for long distances laterally. It is thus made plain that the attraction between accumulation of filth on the surface and the water in deep wells, is mutual. The well exerts a steady pull, and the surface filth a steady push.

Up to a high dilution, water increases the danger of soil contamination. For that reason most pits are worse than surface

closets. Shallow pits are good putrefication vats, and in this process most of the contents become soluble. Cemented pits, if frequently cleaned, are, so long as they remain water-tight, not offensive. But cement is soluble in sewage, and the efficiency of a cemented pit fails in a year or two. Pits to be and to remain water-tight should be surrounded by at least a foot of well puddled clay. The grease from kitchen waste will preserve cement and keep a pit water-tight indefinitely. To the average suburban builder, that is the chief reason for not admitting kitchen waste to the pit. Where water closets are used, tight pits fill up very rapidly, and where sewer connections are impossible, the expense of cleaning is a burden. This has led to the reprehensible practice of constructing cesspits of rough stone, loosely laid in porous soil. Such pits rarely or never fill, and therefore are said to be self-cleaning. They of course distribute vast volumes of foul water into the surrounding soil, to be cared for by such agencies as chance or nature may provide, but so far from self-cleaning they are all befouling contrivances. Fifteen gallons or so of water with every discharge of the flush tank carry into the soil an amount of filth vastly greater than the slow filtration of an ordinary vault or surface closet.

In some parts of Maryland a form of cesspit is in use, which far excels the loose stone pit in ruinous effect upon water supplies.

It is found chiefly in communities having recently installed public water service, without a sewer system.

When the service pipes of the water company are introduced into a house, the forsaken well is converted to a new and disgusting use. The waste pipes from closet and bath-room are turned into it and it becomes the cesspit. It is a most economical procedure. The well is dug to running water and the local well-digger will tell you that all the wells in the neighborhood have a very perceptible current from northwest to southeast. The well will never need cleaning, for it will steadily and speedily carry away all the sewage to the southeast. Thus, without scruple, the subterranean stream, which is for many people the only water supply, is befouled. In Baltimore county there are hundreds of such cesspits. There are few saving chances in this method of sewage disposal. Typhoid germs poured into such a sewer have an excellant prospect of arriving at the next well to the southeast in healthy and vigorous condition. These underground streams have no bacteria of their own, as rivers have, to dispute the passage of disease bacteria, and filtration through rotten rock or gravel is a very rude straining, not likely at all to be effective against the transmission of quantities of disease germs, directly applied as they are in this case. The typhoid bacillus will survive in a surface stream a trip of many miles. In underground streams the distance to be traversed is often but a few yards.

In the suburbs of Baltimore I can point to live-well cesspits within thirty yards of drinking wells, and the rapidity of the current is such that the interval between pit and well is, I have reason to believe, less than an hour. The velocity of subterranean water has not been much studied, but it is well known that even the ground water, which in many places comes up to within a yard or two of the surface, it not a placid lake, but a steady tide. The subterranean stream familiar to the well digger in this part of Maryland gives plain indications, of a rapid current. Its capacity for carrying off sewage is such that a well four feet wide will, all the year around, dispose of sewage and waste of a large household without showing any signs of clogging or accumulation.

The most primitive practice is more sanitary than this system, and its prolonged toleration is most deplorable. Indeed I do not believe that cesspits of any sort are necessary, convenient, or harmless. The correct method of disposal of human waste is to return it as promptly as possible to organic life. The means of doing this are hardly anywhere lacking.

DISCUSSION.

Dr. Edward Janney of Highlandtown: I was very much pleased to hear these papers. I happen to reside in Baltimore county and it seems to me that wherever I go, the community gets a scolding. In regard to the water supply of Highlandtown, allow me to suggest to you that we have a supply of water, recently started out there, that is run through about 900 feet of gravel, and even when the streams are very muddy, water comes out through the gravel clear, and the analysis gives us the credit of a purer water than you have in the city. If you make an observation from Herring run down, you will see a beautiful stream with gravel on either side, very deep, pure and white, and I believe the city should come out there and establish water works, and that by so doing, you would save millions of dollars.

Col. Rogers of Towson: I am superintendent of the public schools of Baltimore County, and I am somewhat afraid of the condition of health near Chase's. I was applied to, a few days ago, for a permit to have the school closed. The people were very much alarmed and I would like to ask Dr. Sappington if this action is necessary. You know that country and know the water supplies. What course would you recommend for securing pure water for that school; should it have an artesian well, or should the water be brought from a distance? Is not the best way to haul water from a distance in barrels? We have not sunk an artesian well, but have given orders to that effect. I instructed the teacher to have water hauled there in barrels, but

now the question arises, if the infection is general and wide spread, where shall we get good water? We may get the water from a stream within a mile and still get infection. If Dr. Sappington is familiar with the water supply around that school, I would be obliged to him if he would tell me where to get good water.

I was told by a physician of that locality day before yesterday, that there was no diphtheria anywhere in that neighborhood. The people I thought, would resent the closing of the school, but he advised us to do so, on account of the uneasiness in the minds of the people. I would like Dr. Sappington, or any other physician, to answer these questions.

Dr. Abbott, of Philadelphia: It is a very serious matter, sir, to close a school because the water supply is only presumably contaminated, but has not been absolutely demonstrated to be contaminated. There are many ways in which the school may be kept open and the water supply purified. I would suggest, that the water be again subjected to examination, and if found to be dangerous, that another source of supply be sought, and if not dangerous, the water may be boiled or be filtered through some of the trustworthy filters that we have. It is a very serious matter to alarm the neighborhood by closing the school, and I should think some other method should be considered.

Dr. Sappington: Out in the district which Col. Rogers spoke of, there has been not only typhoid fever but diphtheria, and of course we all appreciate the fact that where there is diphtheria, more care should be taken to guard the schools against infection. There were two cases at Middle River, one in a family containing seven children, and in the other case the disease was traced through a man who had visited the child who died of diphtheria. There were two miles between the residences. The children had been going to school, and one of the girls, on whom a bacteriological examination was made, showed diphtheria bacilli, and yet that child was going to school at the same time that the little brother at home had diphtheria. These children were then excluded from school. About one week ago I found five new cases of typhoid in the neighborhood of Chase. As to the water supply of the public school, I think that an artesian well would be the best thing the Baltimore County School Board could provide.

I did not mean to advocate the closing of the school on account of typhoid fever. The only reason I spoke of the necessity for closing the school there, was on account of the numerous cases from which diphtheria might develop. I think Dr. Abbott's scheme of boiling the water might do away with the necessity for securing a supply from anywhere else.

Col. Rogers: The school cannot do that, for we have no facilities for boiling water. We can haul it any distance.

Dr. Stabler: A very small apparatus, such as a kerosene stove that wouldn't cost more than a barrel and horse, would answer the purpose.

Dr. Welch: One or two points have been brought out that I would like to say a word about. Dr. Fulton spoke of many ways in which typhoid fever may be conveyed. I think that is the correct position to take, not to advocate any one method of the spread of the disease. Whilst the drinking water is the most common cause, it is not the exclusive source. It can be taken from milk or from oysters that come from a bed in which sewage has been allowed to empty. There is great uncertainty as to the possibility of contracting the disease through aerial infection. Whether the disease can be conveyed to an individual in the two ways he suggested, by air, or through vegetables eaten in the uncooked state, is a matter of discussion, and by no means settled. There are differences of opinion, but at present it can not be said that there is any proof of the possibility of contracting typhoid fever by inhalation of dust particles in the air.

As to whether it can come from fields fertilized with human discharges that contain the germ is an important point in relation to the disposal of sewage. There are large quantities of statistics which indicate that there is no danger in using vegetables grown upon these irrigation fields. They have studied that qnestion near Berlin, where there are large numbers of these irrigation fields. Those who live on them, and those who use the vegetables have not been shown to be any more subject to typhoid fever than those who do not use them.

I think Dr. Abbott's suggestion that the school should not be closed simply on the grounds of the existence of typhoid fever is correct, but if there are several cases of diphtheria in the vicinity, the school should be closed. No authority would advocate the closing of a school simply on account of contamination of the water supply when that can be so well cared for by the well-known methods.

Dr. Stabler: There is one question which I have had on my mind to ask of some one who knows, and on which I have not been able to get clear information. A number of ways have been mentioned in which typhoid fever can be distributed. The question is, can the disease be borne from place to place on atmospheric dust, and in that way infect water supplies? For instance, we have a case of typhoid fever in the country where there are several individuals down with the disease, the discharges are taken out and thrown upon the soil, and the epidemic ceases in that locality, but, four or five miles off it breaks out, though

8

there has been no intercommunication between the families. Is there a possibility that we have impure water in both instances, and that the germs have been carried by the winds from one place to the other?

Dr. Fulton: I cannot speak with authority on the question just asked, but there is excellent reason to believe that the germ of typhoid fever can be conveyed considerable distances by the air, and by deposit in a suitable medium can convey infection. Several illustrations of this have occurred in the military posts of the far west. Arriving with no sick at all and encamping at the foot of a mountain four or five miles from a water supply, a detail of men go regularly up mountains to get pure water from an uninhabited district. Typhoid fever arrives later in a newly enlisted man. The surgeons take the usual good care of the sick man, but the disease breaks out some weeks later among the enlisted men without affecting at all a company of Chinese laborers. The explanation is that the water being kept in open barrels was exposed to the dust blowing about. No care was taken of the dejecta of the first case. They were dried by the sun, wafted about by the air and may have fallen either into the water barrels or the milk cans. The Chinese escaped because they drink only boiled water in the form of tea.

The germ can stand considerable dessication, and if put into the proper medium for growth will develop. I certainly believe that typhoid fever can be conveyed as dust, though the disease cannot perhaps be acquired by inhalation.

Its mode of conveyance through streams deserves consideration. We often hear that streams are self purifying within a few miles. If the typhoid germ is free in running water it will not live very long, but if it is enclosed in lumps of feces it may travel many miles down the stream, and will live until the destruction of the little lump which encloses it deprives it of a medium, and exposes it to cold, light, and the hostility of the ordinary water bacteria.

The closing of the schools on account of typhoid fever, I think, has never been contemplated by any board of health in Maryland. It has, however, been done in the case of diphtheria, and I think the health officers would do well at times to close up schools for rather small outbreaks. Schools are the chief agents in the propagation of this disease, and that fact needs to be emphasized. I think the chief of any school board migth relieve himself of responsibility by throwing it upon the health officers. It would tend to make the health officers careful in issuing such orders, and it would make the people more careful about sending children to school from infected houses. The epidemic at Middle River has grown from the neglect of stringent orders in regard to the funeral of a child that died there.

Few schools in Maryland have private water supplies, and I think it is very unfortunate. The correct remedies have been suggested by Dr. Abbott, filtration or boiling the water at the school, but I think a systematic examination should be made of all the public schools in Maryland, and they should have and should take care of their own water supplies.

Mr. Hartshorne, of Brighton: I speak not as a medical man, but as one having had experience in stopping the use of a well which could not be fastened. Put about one half or one pound of permangate of potash in the well and they will leave the water alone when it comes up looking bloody. It will do no harm. I stopped one well in that way and found it a very satisfactory method.

DISINFECTION.

Dr. A. C. Abbott,

Bacteriologist to the Health Department of Philadelphia.

In the course of all diseases, there are thrown off in one way or another, materials that are able to convey the disease. With this fact established, the question arises why is not disease more common with us than it is, and why are infectious diseases not more on the increase. The answers must be viewed from three standpoints: In the first place, the relative number of individuals who are susceptible to infection is small; secondly, there are processes going on in nature that destroy the vitality of the infective material, and, thirdly, there are processes employed by educated and intelligent men that assist in destroying these infectious matters.

It is not necessary to consider the susceptibility of individuals at this time. The statement will suffice, that a large number of persons who enjoy good health are not susceptible. As to the natural processes that serve to destroy the vitality of infectious matter; these matters are living micro-organisms, the majority being bacteria, and we will have to consider in a general way the whole group of bacteria in order to understand some of the reasons why they are destroyed. We may sub-divide them into two groups, one that is directly concerned in the production of disease and one that is not in any way concerned in the production of disease, but is concerned in that process of nature by which ordinary decomposition and putrefaction goes on. Now it is generally supposed, that there is a mortal combat between these two groups. The pathogenic organisms find the conditions best suited to their existence in the body of the living human being,

or in the animals or vegetables. When thrown off from the body of the animal in which they find the best conditions of life they have to compete with that large group of saphrophytic organisms that are quite at home in the outer world. Again they are subject to influences that tend to shorten their vitality. Dessication sooner or later destroys the vitality of all organisms that are not in the spore stage. In that stage you do not have the destruction within a reasonable time. Fortunately for us the majority of organisms do not have the property of going into this spore stage. Again we have in nature an active disinfectant in sunlight. The exposure of organisms to this light together with dessication, results in their destruction. Finding their way into the soil and water, as they do, they meet there other circumstances that are unfavorable to their growth. They do not find the temperature that is favorable to them, and they find too, possibly, more highly organized plants in water that are detrimental to them, so that water containing many of these organisms becomes after awhile in part if not entirely purified. It is not well, however, to believe that a river flowing eight or ten miles becomes of necessity, purified by the flow.

Now we come to another part of our subject, that part relating to the efforts of man in reducing infection, and here we have the various processes known as disinfection. From now on there will be used certain terms that it may be well to define at once. Disinfection means a destruction of infection, but by the processes ordinarily employed something more is done. There is no mass that we meet with in practice that contains nothing but infection, so that disinfection may be disregarded as a process by which the living matters and their spores are destroyed. An antiseptic is something which prevents the development of micro-organisms without destroying them. An antiseptic may prevent their growth without of necessity killing them. A deodorizer may be either a germicide or an antiseptic, or neither, (as a rule it is neither,) and it usually substitutes merely one odor for another. Disinfection may be accomplished by chemical or physical disinfectants. The chemicals divide again into gaseous or solid substances. In the gaseous disinfectants it is thought we have a substance that mixes freely with the air, and penetrates into all pores of the materials in the room. From this standpoint no gas has received the same amount of confidence as sulphurous acid gas. It used to be considered necessary to burn a little sulphur in the room, and that its gaseous penetration was complete, and resulted in disinfection. With the development of the means of studying these methods, it was soon manifest that though the odor was penetrating, its disinfecting qualtties could not be demonstrated even in rooms that were filled as full of the gas as its mode of production would permit. If the

objects had been previously moistened, the gas was absorbed, and then being in solution there was some slight disinfection, but in the dry state it failed. Now it has practically been abandoned.

There has been introduced another gaseous body, formaldehyde, of which you will hear more from the gentleman who is to follow me. It is simply obtained from formalin, which is a 40% solution of the gas. It seems to have a trustworthy disinfecting power at least for objects on the surface. Those are the only two gases worth mentioning in practice. Chlorine, Iodine and Bromine all have disinfecting powers, but they can not be generated safely, and are very destructive of the materials to be disinfected. In the dry state they are no more satisfactory than sulphur and not as good as formalin.

Next we come to the use of solutions, and here we have the most efficient mode of chemical disinfection. We have here a method of bringing the germicide directly in contact with the materials to be destroyed, and for the process of disinfection to be effectual these things must be brought into contact with each other. It is absurd to put carbolic acid into a room, and because the room becomes filled with the odor, to think that disinfection is going on. Whatever solution is used must be brought directly into contact with the micro-organism to be treated. Now what is said for one chemical agent may be said for the whole group, and, it is not my intention to run over the whole group but merely to mention some germicides that can be used with confidence. I may say that the qualifications or requirements of a germicide to be used in the community by all sorts of people, those who know what they are doing and those who do not, must be cheap, must be destructive of germs, and must not destroy the articles to be disinfected. The most common is ordinary whitewash, called in the books milk of lime, and made by slaking one part of lime in four parts of water. Another is a fresh preparation of chloride of lime, ordinarily used by sprinkling about in the solid powder, though that is not the best may to use it. It would be better to have it in a solution of from 2% to 4%, which when mixed in large quantities with the infected materials, or when used in wiping down walls and woodwork is a trustworthy disinfectant. Carbolic acid is a trustworthy germicide, though it has no destructive power on the spores, but it is not to be put into the hands of every person. In a 3 per cent. or 5 per cent. solution it is useful. Another disinfectant that occupies a high place in this class, but which can not be recommended for general household use, is corrosive sublimate.

Now we come to another group of disinfectants, or rather another group of processes of disinfection, the physical. At the head of the list is heat, either dry or in the form of boiling water or steam. The application of these various processes

depends on circumstances. For worthless material, bits of furniture, clothing, &c., there is no better way than to burn them up. Many things, however, can not be subjected to this mode of treatment. For the disinfection of the great quantities of materials that come into the country and are often carriers of infection it was customary to subject them to high degrees of dry heat, not high enough to destroy the objects themselves, but with the idea of destroying the micro-organisms upon them. Experience has shown that this is not only untrustworthy, but that the goods are frequently destroyed. So this method has been now practically dispensed with, and quarantine stations, hospitals, &c., have introduced other methods. They work in two ways. Large chambers are made to hold the objects to be disinfected, and steam is turned into them, either streaming or under pressure.

These processes are now generally used on a large scale, but they are not applicable for domestic use. What is the best way in the household of using heat? After all, we have to consider domestic practice to meet many of the conditions around us. We must impress the public with the simplicity of disinfection and with the part the public has to assume in the care of the general health. It should be a duty of every nurse not only to attend to the care of infective material but to instruct the members of the household as to what she is doing and why.

What then are the best methods to pursue in our efforts at disinfection in a case of typhoid or scarlet fever or any other disease? Primarily, the essential factor is a knowledge of the nature of, and the channel through which the infective material is given off. I think perhaps you can learn more by following with me the management of a case of infectious disease. Let us consider a case of typhoid fever, through what channel is the infective agent thrown off; a case of cholera, what is the source there of elimination of the infective material? It is certain that in these diseases the infection lives in the discharges from the bowels. Hence, it is not necessary to annoint the skin, as we would in cases of exenthemata, for there is nothing thrown off from the skin. In cases of tuberculosis, pneumonia, influenza, etc., the material is not thrown off from the skin, but largely from the mouth in the expectoration. The attendant must be instructed where to look for the infective materials and to disinfect them immediately.

Let us follow a case. This case we will say is anticipated. It is not always so, but it should be found in a simply furnished room with as few hangings as possible, or, where any hangings are necessary, they should be so cheap that they can be destroyed if necessary. The nurse should at once be instructed as to where to expect the infective discharge. If typhoid fever, it would

be in the stools, which should be placed in a proper receptacle and this disinfected before leaving the room. Boiling water is the best agent for this purpose. If it is a case of diphtheria, the discharge from mouth and nose should be at once disinfected or destroyed by fire. The patient should be isolated, and I do not mean simply confined in a room by himself, but he should have his own clinical thermometer, his own tongue depressor, his own towels, linen, etc., and his own utensils for food and drink. These articles should be disinfected in the room after use, and the best way to have them free from danger, is to have a gas stove over which a little water is kept boiling. The nurse should be instructed to place in this boiling water some common washing soda, which has a germicidal activity, and she should put the dishes into his pail for 15 or 20 minutes. Remainders of food should not be sent back to the house, but thrown into a receptable containing lime, and left there until ready to be removed from the room. Vessels containing sputum, saliva, etc., should not be taken from the bed or the patient and thrown carelessly away, but should be treated with three or four times their volumes of a disinfectant solution. Clothing and bedding should be gently removed and put into a pail containing a disinfecting solution, either carbolic acid or lime, the lid put on the pail, and the whole allowed to stand at least two hours before being sent to the laundry.

The room should be frequently gone over with a cloth soaked in a disinfectant, and all horizontal surfaces wiped off so as to disinfect these surfaces almost as fast as the particles fall upon the them. Now the time comes when the patient is removed from the room, either by death or convalescence, and the question arises what shall we do to render the room free from danger. A great many processes have been employed to render infected rooms free from danger. Latterly, there has been much discussion of the use of gaseous disinfectants, and I have no doubt that Dr. Stokes will give you some information on that point. I say with no desire to flatter you, that at the Philadelphia meeting last month, in a discussion on the best method of disinfecting rooms, the one in use in Baltimore was considered the best. As soon as the patient leaves it the room is closed for 24 hours, which gives an opportunity for the dust particles to settle down. It is then superficially disinfected by the generation of the formaldehyde gas. After this all the objects of density and thickness are gathered up into tightly closing canvas bags and sent to the steam disinfector. Then comes the cleaning process, which is simply a scouring of the rooms with hot disinfecting solutions. There is one point in this whole process, that makes it of greater value than any other; it begins with a superficial disinfection. To begin with a sweeping and cleaning of the room means

simply to distribute throughout the house whatever organisms were present as dust on the objects in the room.

If the patient is removed by convalescence, what can be done to render him free from danger to those with whom he comes in contact? He should not leave the room until he has received a bath in warm water, and been sponged down with Labaraque's solution or something of that kind. He should be supplied with a suit of clean clothes that have not been in the sick room, and his old clothes should be disinfected before leaving the room.

If the patient dies the body should be disinfected by some solution that is trustworthy and odorless, and the body should be interred as soon as decency will permit; I am speaking, of course, of the most highly dangerous diseases now; there is no occasion for such a routine in typhoid fever. I brought with me a diagram that speaks for itself, which I made from a recent report of the Michigan Board of Health, and which shows the influence of isolation and disinfection, in the course of scarlet fever and diphtheria for 1887 to 1894.

DISINFECTANTS.

By William Royal Stokes, M. D.,

Bacteriologist to the Health Department of Baltimore.

Before attempting to explain the use and application of disinfectants, it is necessary to mention a few fundamental facts concerning the objects against which we direct the destructive action of these agents.

It has certainly been proved, that many of the communicable diseases, such as tuberculosis and typhoid fever, are due to the specific action of a class of organisms belonging for the most part to the vegetable kingdom, and called bacteria. These minute objects require a magnification of about 1000 diameters in order to properly observe them. So enormous is the multiplying power of these invisible creatures that a single bacterial cell can, it is computed, produce 281 billions of bacteria in 48 hours by simple transverse division. To do this the cell must be furnished with proper food. In the laboratory this necessary nourishment is usually supplied in the form of solid gelatine, or in such nutrient liquids, as beef tea or milk. By this process of cultivation, one can observe both with the unaided eye and with the microscope, the behavior of bacteria when planted in such nutrient media.

In 24 hours, the transparent fluids become clouded, while the growth on such solid materials as potato or gelatine becomes visible in the form of elevated patches, called colonies, and consisting of millions of bacteria.

These cultures of bacteria show very plainly how we can distinguish between the bacteria which are capable of developing, and those no longer able to grow. Being in possession of such methods of study, we are able to observe the effects of various chemical substances and of physical agents upon the life and growth of bacteria. The outcome of these experiments has been the discovery of two important methods of destroying bacteria, or, as it is technically called, disinfection: 1. Disinfection by physical agents; and 2, chemical disinfection.

Physical Disinfectants.—It would be impossible, in the time allotted, to exhaust this broad field. It has, therefore, been thought best to briefly consider a few of the more practical methods.

Heat is perhaps our most efficient physical disinfectant, and when infected materials are of little value, their actual destruction by burning is the surest way to dispose of them. So radical a method has of course a limited scope, but we can in many instances apply heat, destroying the infection without injuring the infected material.

Many experiments have demonstrated that the germs which cause disease are all destroyed by exposure to a temperature of 212° Fahrenheit, or steam heat, for one hour. This fact has practical importance in the disinfection of bedding, towels, or garments, which have been infected by scarlet fever patients, or which have been soiled by tuberculous sputum, typhoid, cholera, or other intestinal discharges, diphtheritic membranes, secretions from abscesses and infected wounds, and the various other infective products of disease. In case apparatus specially designed for this purpose is not available, such materials can be rendered harmless by boiling for about one hour in an ordinary boiler.

Although such measures are sufficient for ordinary household disinfection, it is often necessary, in large hospitals, or at quarantine stations, to sterilize a great quantity of bulky goods at one time. Mattresses, blankets, clothing and pillows are placed in a steam chamber, and exposed to the steam heat until disinfected.

Dr. Doty, of New York, has lately described this process in detail. His method is briefly as follows:

The disinfecting apparatus used at the New York quarantine station consists of a rectangular steel chamber into which a car is run on steel rails. This car, loaded with the infected articles, is pushed into the chamber, and the door tightly closed. A vacuum of about 20 inches is then produced by a steam exhauster, and steam is turned into the chamber until the temperature has reached 230° Fahrenheit. After 15 minutes the steam exhauster again produces a vacuum, thus removing the steam from the sterilizing chamber. Air is then admitted, and in 10 minutes the disinfected clothing is dry enough to be worn. After drying, the

articles are taken out at the other end of the machine, which opens into a separate room, and clothing can thus be delivered ready for use to the owners, who have in the meantime had a bath.

The vacuum not only greatly hastens the drying of clothing, but also causes an even distribution of the temperature throughout the materials, as proven by tests with thermometers placed in the interior of blankets and clothing, etc. Doty found that he could by this process disinfect the mail without injury, and he was also able to destroy test cultures of such bacteria as the bacilli of plague, diphtheria and anthrax, even when inclosed in the interior of books, blankets and mattresses.

He concluded from his experiments that exposure for 15 minutes to 230° Fahrenheit would kill all known germs present in clothing or other material.

This method can, therefore, be used for disinfecting the bedding of a ship, and the clothing of immigrants, and it has been adopted for similar purposes in many large hospitals.

Sunlight.—Sunlight is nature's disinfectant, and experiments have shown that exposure to its direct rays for a few hours will destroy the germs of tuberculosis, typhoid fever and diphtheria. The old method of exposing infected linen, carpets, etc., to the sun has thus been proven of value, and the rays of the sun must often destroy many of the bacteria present in infected hospital wards. This influence is also beneficial in destroying many of the bacteria deposited upon the surface of the earth, and even the upper layers of rivers must be somewhat purified by this agent. Sunlight should be always regarded as a universal enemy to disease, and it should be always admitted freely wherever men live or work. General cleanliness and the removal of decomposing material will also lessen the risk of infection by depriving the germs of the food which they desire.

Chemical Disinfectants.—A large group of chemicals possess the property of destroying bacteria, many of them being effective, even in dilute solutions. Among these substanees are the acids, many metallic salts, a number of coal tar products and essential oils. Their uses are so varied, that it would be useless to attempt a detailed description of each of them, but a few of the typical ones may be considered.

It has been shown that hydrochloric acid will destroy most of the germs of disease, even when diluted about 300 times in water. Carbolic acid is effective when diluted 200 times, while bichloride of mercury destroys bacteria, in even so dilute a solution as 1 to 1000.

These facts are now taken advantage of by the surgeons and obstetricians, who use such solutions for cleansing their patients, as well as for rendering the hands and arms as free from germs

as possible. The risk of introducing infective bacteria into wounds or of setting up puerperal disease is thus greatly lessened, and the so-called antiseptic methods have rendered operations safe, which before the days of Lister were considered almost necessarily fatal. The vigorous use of soap and water upon the hands and arms, followed by their immersion in a 1-1000 solution of bichloride of mercury for about ten minutes, is a necessary procedure before beginning a surgical operation, while all such things as instruments, sutures and needles are best placed in five per cent. solution of carbolic acid. If the arms and hands are placed in a warm saturated solution of permanganate of potash until stained a deep brown, and then in warm saturated oxalic acid solution until completely decolorized, they need only be placed in a 1-500 solution of bichloride of mercury for two minutes. This renders the hands practically free from bacteria. Creolin, a coal tar product, will also destroy germs in about 2 per cent. solution, and this is often used in obstetrical operations.

These chemical disinfectants are also used for the destruction of infectious material on bedding and linen. Infected surfaces in sick-rooms or hospital wards are often washed with solutions of 1-1000 bichloride, or 2 per cent. carbolic acid. The excreta of typhoid or cholera patients can be rendered harmless, by 1-500 bichloride or a 5 per cent. solution of carbolic acid, if well mixed into the material, and the hands of nurses and attendants can be disinfected by weaker solutions. A 40 per cent. solution of formaldehyde called formalin can also be used as a chemical disinfectant.

Prevention of the Spread of Communicable Disease by Means of Disinfectants.—The spread of many of the communicable diseases can be greatly limited by means of disinfectants. Let us briefly consider some of the important precautions which should be observed in regard to such conditions as pulmonary tuberculosis, typhoid fever, diphtheria and the various eruptive fevers.

It should be borne in mind that the expectoration of patients suffering from tuberculosis contains the germ which causes the disease, namely, the bacillus of tuberculosis. When this expectoration dries, the germs can be inhaled as a fine dust and healthy persons must frequently thus contract consumption. In order to avoid this accident, the expectoration of consumptives should be deposited in a covered cup containing a 5 per cent. solution of carbolic acid, which, after stirring, soon kills the bacilli. The sputum can also be discharged into pasteboard boxes made for the purpose and cheap enough to be burned. By adopting this simple safeguard, many cases of consumption may be prevented. Towels, handkerchiefs and soiled linen from consumptives should be boiled, or soaked in carbolic acid for twelve hours

before being used again. The room should be dusted with a cloth dampened with a weak carbolic acid solution, in order to prevent the dust from rising, as well as to destroy the germs. Carpets should also be swept with a damp cloth broom.

In such diseases as typhoid fever and Asiatic cholera the intestinal discharges contain the infective germs. The stools of such patients should be immediately disinfected by pouring upon them an equal quantity of a 5 per cent. solution of carbolic acid, which should remain in mixture with the infectious material for an hour, before the vessel is emptied. The contamination of wells or larger water supply is thus avoided. The hands of nurses should also be carefully disinfected after attendance upon the sick. Soiled linen should also be sterilized or burned.

In diphtheria the discharges from the nose and throat are the chief vehicles of infection and these can be received upon old linen cloths, which are at once burned. If there is much expectoration it should be received in vessels containing carbolic acid solution. Bed clothing or linen which has been soiled by these secretions should be boiled, or disinfected by means of the solution which has just been mentioned. All articles which come in contact with the patient's mouth, such as knives, forks, dishes, spoons and drinking cups, should be used by the patient alone, and these should be carefully sterilized by boiling in a solution of common soda before being used by any other person.

In such diseases as measles, scarlet fever, and smallpox, the specific germ has not been demonstrated, but assuming, as it is reasonable to do, that they are similar to the bacteria which are known, the same general precautions against their spread should be observed.

Certainly the system is better prepared to resist disease when surrounded by a clear, healthful environment. In order to lessen the frequency of epidemics, therefore, certain general rules of personal and domestic cleanliness should be scrupulously followed.

All receptacles for intestinal discharges or urine should be cleaned by frequent flushings of water and also occasionally disinfected with dry chloride of lime. This is also an excellant material for the purification of privy vaults or wells. It should also be used in large quantities upon garbage deposits or other collections of decomposing material. Streets and gutters should be frequently flushed with water, and, when necessary, disinfected with chloride or milk of lime.

Disinfection by Formaldehyde Gas.—And now, having considered some of the means which are used in order to avoid infection from the patient, the question arises as to whether a room which has contained a case of communicable disease can remain a source of infection to others. From what has been said it will be seen that dried tuberculous expectoration and diphther-

itic secretions can and do infect healthy persons and the dry epidermic scales from a scarlet fever patient probably spread the disease.

We now possess a method of disinfecting rooms by which the germs of all these diseases can be destroyed, and its efficiency has been tested by intentionally exposing infected materials in rooms of ordinary size. This most important sort of disinfection is done by the use of formaldehyde gas and many elaborate processes have already been devised for generating this powerful germicide.

In most of the processes a substance called formalin is used. This is merely a 40 per cent. solution of formaldehyde gas. One quart or more of this formalin is placed in a large receiver, with chloride of calcium in order to prevent any steam from mixing with the pure gas. The receiver is then tightly closed and a lamp beneath the receiver is used to heat the mixture. This causes the liberation of formaldehyde under pressure and it is introduced into the room through the keyhole by means of a fine flexible metal pipe. All openings and cracks should be stopped up in order that the gas may be confined as closely as possible within the infected space. Formaldehyds can also be generated from a pastile, causing superficial disinfection.

Germs of all the various diseases, such as cholera, typhoid fever, bubonic plague, anthrax, tuberculosis, diphtheria and the germs of ordinary inflammation have been exposed in closed rooms to the action of this gas. Pieces of cloth soaked in cultures of disease bacteria have been exposed freely in the room, or covered by blankets and carpets. Germs have been placed between the leaves of books, put into envelopes, in the pockets of clothing, or even placed in the interior of mattresses. It has been found, that after exposure to this gas, not only were the germs on the surface destroyed, but if enough gas was present, the germs covered by blankets, or even the depths of a mattress, were killed. This was proven, by placing these same germs on culture media, after exposure to the gas, when it was found that they were no longer able to increase, and form visible growths. About one quart of formalin should be evaporated in a room of 1000 cubic feet, and the room should be closed for 24 hours.

Such treatment will destroy any germs which may have been left in the room by a recent patient, and render it a safe habitation for future use. It will also destroy any germs which may have remained in the folds of draperies or hangings, and even clothes hung up in the room can probably be rendered free from infectious bacteria. The method also possesses an advantage over many other similar processes in that it does not alter or injure the colors of fabrics, furniture or other articles of household use.

The gas is not poisonous, but it is extremely irritating to the mucous membranes of the eyes and respiratory tract. This irritation can be avoided by rapidly opening the windows without drawing a full breath in the room, and by wearing close-fitting goggles. All things considered, it would seem that formaldehyde gas is a very satisfactory disinfectant, when used in sufficient quantities, and it is already being extensively adopted for routine disinfection.

There is reason to hope that by the use of a few simple measures, diseases, which now are of daily occurrence, may become rare visitors.

DISCUSSION.

Prof. Penniman, of Baltimore: There are one or two points I want to touch upon from the standpoint of a chemist. In the first place I notice that both Dr. Abbott and Dr. Stokes, whilst speaking of disinfectants, make an error that is common to bacteriologists; that is, they forget that the action of chemical disinfectants on bacteria is not the only thing to be taken into consideration. Take the bichloride of mercury which is used so commonly. It is generally forgotten that bichloride is easily precipitated by albuminous substances. I myself some few years ago when I was unfortunately compelled to, give some short talks on hygiene, made some experiments with this article, and I found that a comparatively strong solution of bichloride, if brought into contact with feces, would have its mercury precipitated, and bacteria would go on their way rejoicing.

In regard to this apparatus for making formaldehyde gas, no one can have any doubt as to its efficiency, and yet at the same time it seems to me that people of small means would find the apparatus rather elaborate and costly. The great effort made by the manufacturers of the apparatus has been to avoid a difficulty which I think is largely imaginary; that is, to prevent the reforming of formaldehyde into its solid modifications. Any one who has attempted to get these solid forms knows that they are extremely difficult to obtain. It is hard to make the modifications from the watery solutions. I think it is quite certain that for a great many purposes, in households for example, that a very cheap sauce pan, with a pint of formalin and an alcohol lamp, would be quite efficient, and much more so than the use of bleaching powder or sulphur.

Dr. Mittnicht, of Baltimore: I have followed the gentlemen here attentively on these matters, but I fail to hear one touch upon the subject of sunlight as a disinfectant. If any one here will take a walk in any of the streets where there is a school house he will find that the methods employed are in opposition

to the natural methods of disinfection by sunlight. Some of our school houses are almost sealed by blinds, etc. Our Health Board has never called the attention of the authorities to the effect of having the school houses sealed up against sunlight and air. Some of the representatives of the Health Department are here, and I hope they will call the attention of the School Board to this subject.

Dr. Stabler, of Brighton: During the past four or five weeks I have had charge of an isolated case of typhoid fever in Montgomery county, and the problem presented itself to me how to limit the disease to that one case and prevent any one else from getting it. I felt it a very grave responsibility. It occurred in the family of a well-to-do farmer in a prosperous section of the county. The patient, a young man, was a valuable member of the community, and I felt it important in handling the case not merely that the young man should be conducted through it safely, but that other members of the family and the community might be prevented from contracting the disease; and whilst I did not succeed in applying all the methods of disinfection suggested, I think I may state some of the things I did in order to get our minds applied to practical matters. The case was isolated in a small room and all unnecessary furniture was removed. The discharges were disinfected before leaving the room by the use of formalin, which I obtained from the local drug store; but, unfortunately, after using the first pint of formalin and going back for more, I found that the druggist had sold me all he had and could not secure more for two days, so I had to fall back upon bichloride of mercury. After each evacuation of the bowels the solution of formalin was placed upon it and it was then carried out and put upon the soil of a grass field where the sun and air could act upon it, and as there was immediately after the evacuation more or less odor in the room, I advised that the room should be sprayed with formalin from an atomizer. The body of the patient was carefully washed every day with soap and hot water, and cold water was used whenever the temperature went above 102.5°. The bedding was removed whenever soiled and placed in a washing tub in an out-building, the tub being kept partially filled with water containing formalin.

Dr. Abbott: I would like to reply to Dr. Penniman, not only on my account, but on behalf of all bacteriologists. He states that we do not seem to be aware of the fact that bichloride of mercury is decomposed when used upon albuminous substances. I think there is a reason for this. It is such ancient history, and has been known so long that bacteriologists really hesitate to speak of it in a discussion any more.

Dr. Stokes: In regard to Dr. Penniman's suggestion that formaldehyde may be formed by simpler methods, I have no

doubt that simpler methods may be discovered by which it can be generated for this work.

In answer to Dr. Mitnicht's suggestion, I am not sure but I think that some other official would be the one to report this matter to; perhaps the commissioner of public buildings.

I think Dr. Stabler's remarks serve to show how the country practitioners can apply the methods that have proven so efficacious in the laboratory.

Dr. Lewis, Kensington, Md.: I have been very much interested in these papers, especially that of Dr. Stokes. I had occasion to use some of this formalin on a case of scarlet fever in Montgomery county, and I found it very satisfactory indeed. I used one of these lamps as a disinfector, and we stamped the disease out in the town.

Mr. Penniman: I did not mean to criticise the knowledge of bacteriologists generally, for I supposed that every bacteriologist knows that bichloride of mercury is precipitated when brought into contact with albuminoids, but what I meant to make clear is that results which, under some circumstances are invariably obtained, under other circumstances will just as invariably fail. When we treat a solid substance with it, for instance a glass vessel, any bacteria deposited there will be destroyed, and most people are apt to conclude, seeing this delicate experiment, that bichloride of mercury is a very good thing to use on large masses of infected material like feces. Their confidence would be badly misplaced. Attention to this point did not begin any too early, and I am sure that reiteration may go on for some years before the subject will become ancient history even in Philadelphia.

Thursday—Evening Session.

The meeting was called to order by the President at 8.20 P. M.

SOME OF THE DANGERS ARISING FROM SLAUGHTER HOUSES, WITH SUGGESTIONS FOR MEETING THEM.

By Ch. Wardell Stiles, A. M., Ph. D.,

Zoologist to the United States Bureau of Animal Industry.

Ladies and Gentlemen.—If you were to review with me the publications upon sanitary science which have appeared during the last quarter of a century, you would notice that the authors in this branch of medicine may be divided into three general classes: Two classes representing extremes, the other the mean.

The writers of one extreme school seem blind to the advances which their colleagues have made by patient study, observation and experiment; they trust more to prejudice than to demonstration, and clinging to views conceived in ignorance they even deny the germ theory of disease. These men, though now in the minority, form a dangerous element in medical circles; for notwithstanding the overwhelming evidence against their views, they necessarily exercise a certain amount of personal influence among the laity, and thus hinder the spread of truth and the adoption of proper sanitary measures.

The writers of the other extreme are to my mind none the less dangerous to the cause of public health. They preach the doctrine, that every breath of air we inhale, every drop of water we drink, every mouthful of food we eat, bears the germs of certain death. The logical conclusion to their views is, that the human race, together with most of the animal kingdom, will surely be extinct before another year has passed; and it is a fact hardly possible of conception that there are any of us alive today. The sanitary measures these extremists propose are, like the views they advance, purely theoretical, and both their views and their proposed prophylactic plans tend to prejudice the public mind against sanitary measures in general, and to bring science into disrepute.

To the third school of writers belong nearly all the original investigators and the majority of the better educated practicing physicians. These men, while demanding the acceptance of the germ theory of disease, demand with still greater emphasis the recognition of the fact, that whatever be the danger arising from disease germs, there are rational methods of meeting those dangers, and of preventing disease. Some diseases have been absolutely stamped out of existence in certain localities, by following such rational measures. Other diseases have been greatly lessened in frequency by corresponding prophylactic means.

In speaking to you this evening, I wish to speak from the standpoint of a member of this last mentioned school of scientific workers. I wish to draw your attention to certain dangers which threaten us, and to remind you of certain diseases which are on the increase. This I do, not in order to cause a panic; not in order to frighten people; not in order to theorize; but in order to emphasize with greater stress the point, that it lies within our power to combat these diseases, and to stamp some of them out of existence; and that too with means which are both rational and easy of application.

With this general introduction I invite your attention to a consideration of certain problems connected with the subject of slaughterhouses. Permit me to remark, however, that I have

never visited a single slaughterhouse in the State of Maryland, and that all of my remarks are based upon slaughterhouses in general, and upon what I have seen elsewhere. I will tell you what I have found in other States, how the conditions should be met there, and how those conditions at a distance affect you; you who are acquainted with this State can then make the application of my remarks according to their pertinency to the conditions here.

A slaughterhouse is a slaughterhouse the world over, and as you have very little sanitary control of the slaughterhouses in Maryland, I have no doubt that conditions I will describe for other States, could easily be duplicated here.

Generally speaking, the places for slaughtering animals for food may be divided into large abattoirs and local slaughterhouses. The former are usnally located in cities, and operated in connection with packing houses. The latter are used chiefly by the meat dealers of country towns, and the animals slaughtered at such places are generally, if not always, for local consumption. In our present discussion we will leave the abattoirs out of consideration, so that the criticisms here made upon the local slaughterhouse in its relation to disease, do not apply to the large abattoirs which prepare meat for export and interstate trade in accordance with the system of Government inspection now in force.

Local dealers supply themselves with meat from various sources. Some obtain all their meats from the packing houses where federal inspection exists; others drive from farm to farm, buying animals and slaughtering them on the premises; still others buy slaughtered animals which farmers bring to town; while the majority of dealers in small towns own or rent slaughterhouses where they do their own killing. In many cases these houses are located on the banks of rivers or creeks into which they drain. Frequently the offal is thrown down the embankment and left there to be eaten by hogs, dogs and rats, or in some parts of the west by Indians, or to decay and drain into the stream. Quite often the slaughterhouses are located on farms, the butcher giving the offal to the farmer as feed for his hogs, in lieu of paying rent.

Now a very important matter to be noticed from a standpoint of public hygiene is that in case a town is provided with more than one slaughterhouse, these houses are generally scattered north, south, east and west, each butcher apparently trying to so locate his house as to prevent any undue amount of curiosity on the part of his competitors regarding the character of his stock. Another point of importance is that slaughterhouses are usually situated just beyond the borders of the town which they supply. Thus they do not come under the supervision of the local board

of health; and as few, if any, of the State Boards pay any attention to them, these places of slaughter are without any sanitary supervision.

The first matter to notice in connection with this subject is, that every slaughterhouse is from the very nature of things a center of disease; and naturally the poorer the condition of the premises the more dangerous they are. These facts will appear clear if we consider what takes place at one of these houses. Even if only a few animals are slaughtered each week, the total number may amount to several hundred during the year. Some of the animals are surely diseased. At least one of the hogs has trichinosis, and when the offal of this hog is fed to other hogs which are raised on the grounds, these hogs cannot escape infection with trichinae. But that is not all. Slaughterhouses are often overrun with rats; the rats feed on offal, and when feeding on the offal of a trichinous hog, they likewise cannot escape infection with trichinae. As a matter of fact, about 55 per cent of the rats I have examined from slaughterhouses have been found to be infected with this disease, so that if a hog at a slaughterhouse eats a rat, the chances are fifty-five in a hundred that he will catch trichinosis. Now, suppose that a slaughterhouse is burned or abandoned, the rats inhabiting the premises naturally wander to the neighboring farms in order to obtain food, and of every hundred rats which leave the slaughterhouse, fifty-five carry with them the disease know as trichinosis. This disease they transmit to hogs if eaten by them.

From this it is seen that every slaughterhouse where hogs are killed, is a center for the spread of trichinosis to neighboring farms, and thus forms one of the great factors in keeping this disease alive, so that to-day about 1 per cent. of our American hogs are infected with trichinae. Yet, fortunately, because of our custom of cooking pork thoroughly, the disease is usually killed before we consume the meat, and our cases of trichinosis in man are thus reduced to the few, chiefly Germans, who eat raw or rare pork.

But trichinosis is by no means the only disease transmissible to man which centers at the slaughterhouse. Of the cattle killed during the year, some of them surely have tuberculosis. In many cases, as I said, the entrails of the slaughtered animals are thrown to the hogs on the premises. What is the result? There can be but one result, and that is to spread tuberculosis to the hogs.

Fortunately, we find that only about three thousandths of 1 per cent. of the American hogs have to be condemned because of tuberculosis, and here again our custom of thoroughly cooking our pork protects most of us to a great extent against infection from this source.

Let me pass, however, to another disease, which is apparently on the increase in this country, and against which we have at the present moment absolutely no protection; and yet a disease which we could easily stamp out of the country in a few years if slaughter-houses were properly regulated. I refer to hydatid disease.

Hydatid disease is caused by an animal parasite, which passes its adult stage in the intestine of Old Dog Tray, in the form of a very small tapeworm, almost the smallest tapeworm known. Its larval stage is the largest larval tapeworm known, varying from the size of a bean to that of a child's head, and living in the liver and lungs of cattle, sheep, swine and a large number of other animals, including man. Its complete life cycle is as follows: Starting with the adult tapeworm in the small intestine of dogs, the eggs are scattered on the ground and swallowed by cattle or other animals with the fodder or water. Upon arriving in the stomach, the egg shells are destroyed and a six-hooked embryo, which is thus freed, bores its way through the intestinal wall and wanders to the various organs of the body; coming to rest in a suitable place, it increases in size, forming a bladder which generates numerous heads, each one capable of developing into an adult tapeworm when swallowed by a dog

Now anyone who has had the misfortune to visit a slaughter-house knows that dogs soon find that these premises are excellent places to obtain food. The butcher, of course, cannot utilize the parasite in his trade, notwithstanding the popular saying that the Chicago packers make use of every part of the hog except the squeal, so he throws the infected organ aside, or he at least discards the infected portion of the organ. This discarded portion, however, forms a delicacy for the stray or pet dog which happens to be near; and thus becoming infected with tapeworms the dog proceeds to unconsciously transmit this disease to the persons who pet him or to the flocks and herds he is supposed to keep from danger. Let us first see to what extent the disease is found in live stock and then in man.

It is claimed that in some districts of Iceland every sheep of three years old is infected, while it is an exception to find a cow ten years old which is free from the disease. In India, about 70 per cent. of the cattle are infected. In Germany the statistics vary for different animals and for different parts of the country, from 1 to 37 per cent. Turning to our own country, we have as yet no exact statistics upon this disease, but at a rough guess, judging from what I have seen at various slaughterhouses and abattoirs, I could estimate that about $\frac{1}{4}$ to $\frac{1}{2}$ of 1 per cent. of our American hogs harbor this parasite.

Turning now to the disease in man, let us start out with the statement that this worm is the fatal animal parasite found in

man, 50 per cent. of the cases of infection dying within five years. The disease is especially common in man in Iceland, it being estimated that about 2 per cent. of the inhabitants are infected; it is also quite common in Australia, where 3,000 cases are reported from 1861 to 1882, or about 150 cases per year.

In Central Europe the hydatid is found on an average once in every 130 post-mortems, while in Rostock it is found in nearly 2½ per cent. of the post-mortems. In our own country the disease is not so common, but one of my assistants, Dr. Sommer, recently compiled for the United States 100 cases, which were reported in various medical journals.

Taking the world at large, certainly 500 lives per year would be a very moderate estimate of the victims of this disease transmitted to us by Old Dog Tray.

Why not do something to check and eradicate this disease before the United States takes its place with Australia, Germany and Iceland, in this annual human sacrifice? What can we do? I hardly need to answer that question. You all see that the slaughterhouse forms the center of infection for this malady and that we can control the disease by the simple method of keeping dogs away from slaughterhouses. Several other countries have set us the example in this respect, and let us look for a moment at the results which have already begun to show themselves in cattle and sheep, and to a less degree in hogs and man.

There has been a regular decrease in Berlin and Prussia in the number of lungs and livers of cattle and sheep condemned for this disease, the statistics falling for cattle from 4.6 per cent. of the lungs and 1.8 per cent. of the livers in 1888–1889, to 1.7 per cent. of the lungs and 0.5 per cent. of the livers in 1892–1893; in sheep they fell from 1.4 per cent. of the lungs and 0.9 per cent. of the livers in 1888–1889 to 0.9 per cent. of the lungs and 0.3 per cent. of the livers in 1892–1893.

I might discuss still other diseases which we can attack at the slaughterhouse, before they have a chance to attack us at our homes, but I will content myself by simply referring to tapeworms, and will now pass to the measures we ought to adopt to prevent these and other diseases.

First of all, it is perfectly clear that since every slaughterhouse forms a separate center of disease, the fewer slaughterhouses we have the easier it will be to control the diseases. In a tour of inspection I made not long ago, selecting two different States. I found that 29 towns, varying from about 100 to 1600 inhabitants, were provided with 69 local slaughterhouses. Sixteen of the towns had 2 slaughterhouses each; eight had 3 each; two had 4 each, and one had 5. Thus these 29 towns provided 69 centers of disease for the surrounding area.

You can foresee my first suggestion for improvement. It is to segregate the slaughterhouses, compelling all of the butchers of

each town to do all of their killing in a given inclosed area. The slaughterhouse could best be built by the city, stalls being let to the butchers for slaughtering purposes.

Does this sound too much like paternalism? I hardly think so. The city looks after our water supply and sees to it that it is pure. Is our meat less important than our water?

The segregation of slaughterhouses is to my mind the first and most important step to be taken in preventing diseases which center at these places.

This suggestion will naturally not meet with the approval of all butchers. The objection will be made that they have money invested in slaughterhouses and that any change will mean financial loss to them. To this I would reply that all or nearly all local slaughterhouses are frame buildings, which are not of much value; they are cheaply built and poorly arranged; they represent an infinitely smaller investment than the stock of neighboring farmers, or the lives of the inhabitants, computed at the legal value; and the temporary loss to be sustained by the butcher will be infinitely less than the continuous loss sustained by neighboring farmers and by the community at large. Furthermore, these numerous slaughterhouses are menaces to public health and under these circumstances a small financial loss to a few individuals cannot be taken into consideration

Another objection that will be made by the butchers is that while the segregation of the slaughterhouses would reduce the number of centers of infection, it would not reduce the amount of infection in a given district. To this the reply is that the objection is more apparent than real, since a given amount of infection in a restricted area is more easily controlled than the same amount of infection scattered over a large area and in different localities.

Objection will also be made that this segregation of the slaughterhouses is an innovation, an experiment, a scientific theory which is not practicable. The reply to this is, that while it is an innovation in this country, it has been tested and found satisfactory in other countries, where practical experience has borne out scientific theory and where the plan has been shown to be entirely feasible.

Objection may be raised that one butcher does not care to be subjected to having his business open to the gaze of other butchers. This objection answers itself. There undoubtedly are butchers who would object to having others butchers see the class of stock they kill or raise, and the sooner the health authorities exercise some control over these dealers the better.

My second suggestion relates to the director of the proposed municipal abattoir. If the slaughterhouse is placed under city control, the natural tendency among certain people will be to

claim that patriotism calls for the appointment of the director according to his political pull. I would modestly suggest that an unsuccessful blacksmith, or barber, or a physician, dentist, or druggist who has failed in your State examination, is hardly the person to be appointed director of a municipal abattoir, notwithstanding his political pull. In this matter of public health we are dealing with life and death and we must have a man equal to the position. Personally, I believe that the man appointed should be a veterinarian and should be, ex officio, a member of the local board of health. And by this word, veterinarian, I do not mean a quack horse doctor, but rather a well educated and scientifically trained graduate of a reputable school, and besides that a man of experience in gross pathology and meat inspection. The scientific meat inspector can render public service in the prevention of disease among men and live stock, to a degree scarcely dreamed of by the non-technically trained laity.

While not calling into question the honor of all butchers, I will state that my experience has taught me that some of them forget that their business has its ethical as well as its financial side; and I have had more than one butcher boast to me that he bought diseased animals when he could and placed them on the local block, because he could buy them cheaper than he could buy healthy animals, and because his customers could not tell the difference between good and poor meat. Few of you have any conception of the condition of some meats which go on the block in places where no system of meat inspection exists.

I would, therefore, urge the appointment, as director of the municipal slaughterhouse, of a competent veterinarian, with assistants, if necessary, whose duty it should be to inspect all meats at the time of killing, or immediately afterwards, and before any of the organs are destroyed.

My third suggestion is on behalf of the butcher. While I believe every butcher sins more or less in selling meat which he ought not to sell, he unquestionrbly does so unintentionally and innocently in many cases. He is not trained in pathology and does not understand the exact nature of all he sees. He may even tell his customer that this or that meat is not an especially good article, but it cannot be expected that he knows the danger connected with lesions which even few physicians would at first recognize.

The proposition that diseased meats, which are dangerous as articles of food, should not be allowed on the open market, is one which will receive universal support from all sanitarians, and also from the thinking public. The question, however, arises as to the classes of diseased meats, and the stages in these diseases that justify their condemnation or that justify their sale, and the method of their disposal if condemned.

In some foreign cities regulations exist or have existed compelling the burial or cremation of meats affected with certain diseases. To such extreme measures I am opposed, and this for several reasons. First, such destruction by burial or by burning is in itself an expense. It also results in a total and unnecessary loss of the carcass. Again, the burial of a diseased carcass, unless buried in quicklime or other destructive material, does not meet either the practical or the theoretical requirements of destruction of disease matter. Take trichinosis, for instance. In some places the carcasses of trichinous hogs have been buried by order of the sanitary officials. After this has been done, the owners of the carcass have disinterred the hog, and it has been used for food. This has happened a number of times in Germany, one case being reported within less than a year past.

Even had these human rats not disinterred the body and fed it to their friends and customers, the grave would have been accessible to rodents, such as rats, field mice, etc., which would not hesitate to feed upon the carcass, and thus become infected with the disease, resulting in a possible (theoretical ?) ultimate transmission of the disease to other hogs. Finally, I am opposed to this method of alleged destruction on the ground that diseased or partially diseased carcasses can be utilized under certain conditions and restrictions or in certain ways, so that the owner will not lose the entire amount of his investment.

Three methods in particular are open, the method selected being dependent upon the nature, extent or stage of the disease, and the facilities at hand. These methods are: (1) Utilization as fertilizer; (2) rendering the meats harmless by cold storage, cooking or preserving, and then placing them upon the market; (3) selling the meats under a declaration of their character.

In determining the nature, extent or stage of the disease, and its relation to the method of disposition of the carcass, the opinion of the meat inspector must, of course, be based upon certain general principles, and must naturally be final.

Utilization as Fertilizer.—There is no parasitic disease known which will withstand the degree of heat used at the large abattoirs in the preparation of fertilizers. "Tanking for fertilizers" is, therefore, an absolutely safe method for the disposition of condemned meats, no matter how serious the infection is or to what extent the disease has progressed.

In connection with certain bacterial and parasitic diseases, however, a question arises as to the necessity of condemning to the tank certain diseased conditions. A case of generalized cestodetuberculosis (Cysticercus bovis) should undoubtedly be "tanked," but in a very light infection the question takes a different aspect, namely: Cannot the diseased portion be cut out, and the rest of the carcass be placed on the block? To allow such meat on the

market, leaving ths consumer to suppose that he is purchasing a first-class article, is evidently an injustice to the buyer, for it is by no means certain that all of the parasites have been detected and removed. To condemn a light infection of this disease is, on the contrary, an injustice to the dealer, for there are methods by which the remaining parasites, if any, may be rendered harmless, and in this case the dealer could be saved a part of his loss. To judge between those cases in which the carcass is absolutely unfit for food, and therefore to be condemned, and those cases in which the carcass may be treated according to methods which will destroy the remaining but undiscovered parasites, thus rendering the meat fit for food, is a point upon which the expert meat inspector must decide,

To follow up the example cited, let us examine the effects of cold storage, cooking and salting. It is evident that the method chosen must depend upon the facilities at hand. At a large abattoir any of these methods might be followed, but at a small country slaughterhouse the choice would be restricted.

Cold Storage.—Experiment shows that the parasite under discussion (cysticercus bovis) dies about two or three weeks after the death of its host. Three weeks of cold storage would therefore render a light infection of this kind absolutely harmless, and the meat could safely be placed on the block. With the disease known as pork measles (cysticercus cellulosae) the parasites live for a month, so that more care would be necessary in dealing with it.

Cooking.—Many of the abattoirs voluntarily tank for canning certain meats of inferior quality. The heat to which these meats are subjected is not so great as that used in tanking for fertilizers, but as cysticercus bovis can not survive a temperature of 140° Fahreinheit for five minutes, and as the meats tanked for canning are thoroughly cooked, it may safely be asserted that a light case of "beef measles" would be rendered perfectly harmless by the cooking preparatory to canning.

The same applies to cases of trichinosis. The parasite of this disease can not withstand a heat of 70 C. (150 Fahrenheit), so that if trichinous pork is cooked until the entire piece has reached this temperature and assumed a light-gray color, the disease is rendered non-transmissible to man.

Salting.—The parasite of "beef measles" is killed in twenty-four hours by the action of salt solution, and we have found no case where the parasite of trichinosis has been able to withstand four months in the "pickling vats." In both of these cases it must be remembered it takes some time for the salt to thoroughly permeate the tissue. It would accordingly not be safe to assume that in a piece of measly beef which had been placed in brine for

twenty-four hours the parasites had been killed. The length of time necessary to guarantee the result is, of course, dependent upon the size of the piece of meat. A safe rule is to cut the meat into pieces of any length, but not over six inches thick, and leave them in brine for two weeks.

Selling Infected Meats Under Declaration.—While the large abattoirs have means at their command by which cases of light infection may be rendered non-infectious, the smaller slaughter-houses are at more of a disadvantage in this respect. Cooking and salting would be possible for some—perhaps all of them—while cold storage would often be out of the question.

In this connection it will be well to study for a moment a system which is extended in certain parts of Europe and to consider whether it would not be advisable for cities and towns to give the same system a trial in this country. Reference is made to the German "Freibank" or "Finnenbank."

In some parts of Europe certain meats of inferior quality are allowed on the market under given conditions. One of these conditions is that they must be sold in a specially licensed meat stall or counter, known as the "Freibank," or "Finnenbank," where the true nature of the meat must be made known to the purchaser. Naturally such meats are sold at a lower price than the meats offered in open market, thus enabling many of the poorer classes to purchase meat who cannot afford to pay the regular prices. Meats which are absolutely dangerous from a sanitary standpoint are, of course, excluded from these special meat counters, and in some instances the law requires that even these meats of inferior quality, which are harmful in some cases, though not dangerous, must be rendered harmless before being sold.

In the United States, inspected meats are, generally speaking, either passed and allowed to go upon the open market or condemned and thus excluded from the market. The German system of the "Freibank" practically results in dividing the meats into three classes, namely: first, meats which may be sold in open market—good or first-class meats ("gute oder tadellose Ware" of North Germany, "bankwurdiges Fleisch" of South Germany, also called "bankmassig," or "ladenrein"); a second class of meats which may be sold only under declaration of their true character, in many cases only after having been cooked or salted under official supervision ("nichtbankwurdig," "nichtbankmassig," "nichtladenrein"); a third class of meats which are unconditionally condemned and therefore excluded from the market.

Ostertag (1896) has recently published a detailed compilation, giving the data concerning the sale of measly beef in 38 cities in Germany. At first there was great prejudice against the meat, so that in some cases the price fell to 2½ cents per pound; but as

this prejudice wore off the price went up to six, eight and ten cents per pound. In some cases the demand for this cheaper meat is greater than the supply.

Objections to the "Freibank" have been raised by some parties, but I am unable to see wherein this system is unfair either to the dealer or to the purchaser, for no one is obliged to buy this meat who does not wish to do so, while anyone who wishes a cheaper class of meat can purchase it at the "Freibank" with the full knowledge of the condition of the meat he is buying. It is perfectly safe to use the meat when thoroughly cooked, and the dealer is able to economize in his business. I take the decided stand, however, that it is far better to subject all of these meats to thorough cooking or other methods of safeguarding before they are placed upon the market.

Summary.—To summarize this subject in a few words:

1. A well-regulated system of slaughterhouses is as necessary to the public health as is a well-regulated system of schools to the public education.

2. Every slaughterhouse is a center of disease for the surrounding country, spreading trichinosis, echinococcus disease, gid, wireworm and other troubles caused by animal parasites, and tuberculosis, hog cholera, swine plague, and other bacterial diseases.

3. The important factors concerned in spreading these diseases are offal feeding, drainage, rats and dogs.

4. These diseases may be greatly held in check and in some cases entirely eradicated in two ways: First, by a reduction in the number of premises on which slaughtering is allowed, on which account it is urged as all important that there be a segregation of the slaughterhouses, so that all the butchers of any given town will be compelled to do all their killing in a common inclosed and restricted area. In abandoning slaughterhouses, care should be taken to destroy the rats, in order to prevent the spread of infection. Second, by regulating the factors concerned in spreading the diseases: (*a*) Offal feeding should be abolished; (*b*) drainage should be improved; (*c*) rats should be destroyed; and, (*d*) dogs should be excluded from slaughterhouses.

5. A licensing of slaughterhouses by the State boards of health and the employment of an assistant State veterinarian, whose sole or most important duty shall be a sanitary supervision of all places where animals are slaughtered for food, are necessary.

6. The appointment on every local board of health of a competent veterinarian, whose duty it shall be to control the class of meat placed upon the block, is urged. All meats should be inspected at the time of slaughter, thus securing for the local consumer the same guaranty that the National Government provides for the foreign consumer and for interstate trade.

7. The prohibiting of the raising of any kind of stock within the premises of slaughterhouses is advised, as are also State regulations to the effect that when a stock animal (horse, of course, excepted) once enters the premises of a slaughterhouse it must never be allowed to leave those grounds alive, but must be slaughtered within two weeks' time.

8. In justice to butchers and as a protection to the consumer, I strongly advocate the introduction of the German Freibank in connection with every municipal slaughterhouse.

SOME PREVALENT DISEASES OF DOMESTIC ANIMALS IN MARYLAND.

Dr. A. W. Clement, Baltimore,

Veterinarian to the State Live Stock Sanitary Board.

The subject of this paper is a somewhat long and wearying one, but I shall confine my remarks this evening to the discussion of some of the diseases which are communicable from man to animals, or vice versa, with one exception—that of the disease affecting horses, which has of late been epidemic in some parts of our State.

The diseases which are transmissible from man to animals and from animals to man are very interesting and of great importance to the community. They are diseases to which have been devoted a very considerable amount of study, resulting in a very considerable amount of good. What Koch has done for tuberculosis and what Pasteur has done for rabies will long be remembered as the very bulwarks of modern medicine.

Tuberculosis.

The question of tuberculosis alone is of eminent importance both as a commercial question and as one affecting the life and comfort of a large portion of our community. A disease which causes the death of one in five, or one in seven, of our population, is no light matter, I can assure you. A disease which is causing today more money to be spent upon it than are all diseases to which humanity is susceptible; a disease which is preventable to a great extent, and one to which science is devoting more attention to-day than to any disease affecting man or animals. It is an infectious disease; there is no doubt about this, as all of you who are physicians—and as many of you who are not physicians—know, it is not only an infectious disease, but the means of infection have been thoroughly studied.

The organism causing the disease was isolated by Koch, and its properties are well-known to all men who work in laboratories. They know that the organism can be detected in organs affected, that it can be grown outside of the body in proper nutriment, and that if inoculated into a healthy animal, that animal will get tuberculosis. Knowing these things as we do, it behooves mankind to do all in its power to prevent the poison from accumulating in the bodies of individuals. Just how to do this is a question which has agitated, and is now agitating the minds of scientific investigators. Whether by curative agents or rather by antitoxine agents to produce a condition of body which is antagonistic to the growth of the tubercle bacilli, whether by improving the condition of humanity so as to make them stronger, better able to withstand the attacks of the tubercle bacilli, or whether to enforce a quarantine upon people suffering from the disease, and against all food products, which may in any way transmit the disease, these, I say, are the main lines of work of the sanitarian to-day, and are more or less fruitful in their results.

Now I do not wished to be called an extremist or an alarmist, but I do believe that the question of our milk supply has very much to do with the disease in children and in adults who drink much of it, and who are anyway delicate. Tubercle bacilli have repeatedly been found in the milk of cows which were visibly affected, and also in the milk of cows which did not show any of the characteristic symptoms of the disease.

All milk from cattle which react to the tuberculin test should be condemned and the cattle slaughtered. This may seem a harsh statement and one which the dairymen of the State will not relish, but it is nevertheless a fact. It will cost much money and who is to pay it? Is the State to do it or are the producers themselves to do it directly? I think the latter. I do not believe that the State can do it directly. Some States have expended large sums of money and are to-day expending large sums of money to eradicate the disease from cattle, and I am of the opinion that it is, to a large extent, a waste of money. Government supervision of such work is always more expensive than the same work undertaken and carried out as a private enterprise. Still the work ought to be done and ought to be done as long as tuberculosis exists, and, it is better that the State do it than not to have it done at all. While I say that the State ought not to do it, I do not mean by any means that the State ought not to have anything to do with it. I do think that the State, through its proper officers, should have control of the work, but it should be paid for by the producer himself.

Certain men in the medical and veterinary profession are to be trusted and more are not. Certain ones will give an honest

opinion while more will give an opinion based upon the amount of money involved in the transaction, and the one opinion may have just as much weight with the public as the other. Before he is allowed to inspect dairy stables and give certificates, the veterinarian should first receive the endorsement of the Live Stock Sanitary Board, and this endorsement should be evidence to the public of his fitness for the position. What the public needs is to be educated up to a pure milk supply, and a pure milk supply can only be assured where the stables are under the constant supervision of an honest veterinarian.

Why would it not be well for the larger of our milk dairies to unite and form a syndicate or trust for the production of pure milk; to have their stables inspected and their cattle tested by competent men and advertise this fact to the public? How long would it be before other dairies would have to get in line or close up shop? If only a few could be gotten to do this at first, what an educator it would be to the public. Objection will be raised to the cost, but how much less the cost would be than if attempted by the State, and how much greater would be the result? The only way to insure pure milk is by inspection of the dairy stables, not by the inspection of milk after it arrives at its destination in the city, though that would have to be done, too, to provide against the practice of some dairies watering the milk to increase the amount.

Tuberculosis is prevalent in the State of Maryland among the cattle; this has been proven by a system of inspection inaugurated by the present Live Stock Sanitary Board, which shows that one and forty-seven one-hundredths per cent. are tuberculous to the naked eye. That is, so many were so badly diseased as to be evident without further examination. That this number would be increased many times by the use of the tuberculin test, has been demonstrated in my own private practice, and from the statistics of other States. I have repeatedly seen cattle which were apparently healthy react to the test, and when slaughtered found tuberculous. I have in my own mind an instance in which one tuberculous animal called attention to the herd, and when they were all tested ten out of seventeen reacted. When slaughtered all were found to have tuberculosis to a greater or less extent. Two out of the seventeen were dangerous to human health. They were all well-bred Jerseys.

While testing cattle for a milk firm in this city, it is a common practice to condemn from ten to twenty per cent. as tuberculous. These too, are animals which show no sign of the disease on inspection. What are we to do with these cattle which react? Is the State to pay for them at a certain value for meat, have them slaughtered and sell the meat if it be not to any great extent diseased? I say yes, provided the owner will properly

disinfect his place, and will buy no more cattle without having them tested. To allow cattle which react to go free, means that some other dairyman, will buy them and place them in his dairy; Then, again, supposing that the cattle are tested and react, subsequent inoculation will give a negative result, for awhile at any rate, so that diseased cattle might be passed as healthy.

What I say of tuberculosis in cattle does not include all of the dangers of infection. How often do children contract the disease from tuberculous people expectorating upon the floor, when children are crawling about? How often do people contract the disease by breathing air laden with tuberculosis germs? These are questions which I leave for the practitioners of human medicine to determine. Certain it is, that if we can have a definite inspection of the milk supply and added to this a proper observation by infected people, of rules of decency, the mortality may be greatly reduced.

Rabies.

Rabies exist in Maryland to a much greater extent than was formerly supposed. Since I became the State Veterinarian, I have seen several outbreaks of the disease in cattle bitten by rabid dogs. It is not an imaginary disease by any means. It is not an hysterical disease brought on by fear from having been bitten by an animal supposed to be mad. It is a definite, real disease, and the sooner the public are made aware of it the better it will be for the public, and the better it will be for the dogs; and the sooner we will have a dog law.

It is a mistake to believe that promoters of bench associations are afraid to have the public know this state of affairs, for they are not. It is not the thoroughbred dog that will suffer, but the mongrel cur which runs about our streets and over our pastures; he is the one that does the damage. Just in proportion to the efficacy of laws in different countries, does the disease exist. In North Germany the disease is rare. In Russsia it is quite prevalent, while in France and England it is not uncommon. Rabies is a distinct disease propagated only by inoculation. Unless one individual has it, it cannot spread; it never arises spontaneously; when an animal has the disease he runs wild and bites everything in his way unless he be confined. He bites at objects indiscriminately. There is a peculiar wild look in his eyes; this stage is followed by the paralytic stage. Animals bitten show symptoms corresponding to their natures. Sheep and cattle, as a rule, show a tendency to horn and to butt. Horses show a tendency to bite and to kick.

I have seen several cases of infection of cattle and sheep. Out of a herd of sixteen cattle one man lost ten from the bite of one dog; another man lost a number of stock cattle and many

sheep; still another lost three cows out of four. In two cows there was recovery after apparent light attacks of the disease, showing, if this be true, that the disease is not necessarily fatal. These are but a few of the many cases which have come under my notice.

A dog law, which would tax every dog in the State, would soon make the disease a matter of ancient history. Why should not such a law be passed by our legislature? It has been said that such a law would be trampling upon the poor man; that it would be legislation for the rich; not so at all. A law imposing a tax of two or three dollars per year upon each dog would not hurt anybody who could afford to keep a dog. The owners would take better care of them, too. They would be kept at home and looked after; more than that, they would be properly fed and not half starved, as many of the curs are at the present day. I believe that such a law is perfectly practicable, and I believe it would work well, looked at from a commercial point of view. Why any farmer should be opposed to it, is more than I can see, when he knows of the number of sheep killed in the course of a year by dogs.

Every dog licensed should wear a collar bearing an inscription of the owner's name and the number of the license. Every dog not having such a collar, should be caught and destroyed. In our larger cities these dog catchers should be employed by the Society for the Prevention of Cruelty to Animals. They should be uniformed and have the legal right to do what they are doing. Unclaimed dogs should be killed by the Society, and they should be allowed a certain sum of money for doing the work. The dogs could be kept somewhat under inspection while awaiting ownership. Dogs with contagious diseases should be promptly separated from the rest, and measures taken for the prevention of the spread of these diseases amongst the unaffected dogs. As it is now, diseased dogs are kept in close contact with healthy dogs. Dogs with distemper are placed in the same pen with healthy dogs. At any rate, whatever the method settled upon for its execution, the State should pass a dog law, and should see to it that its penalties be rigidly exacted.

Cerebro-spinal Meningitis.

As to the disease in horses which has caused and is causing so many deaths, I shall not say much for the simple reason that not much is to be said. It is a disease which has ordinarily been called cerebro-spinal meningitis, but the queer thing about it is that there are no cerebral or spinal lesions observable. There are no lesions whatever observable upon post-mortem examination. I make this statement not only upon my own observation, but upon the observation of many others. Our worthy president,

Dr. Welch, has been with us at autopsies and he quite agrees with me; so do many more.

Johne, in reviewing Siedangratzky and Schlegel's work upon what appears to be the same disease, does not agree with them that there is ever a serous meningitis. Johne, however, finds a diplococcus in the spinal fluid, which, by injection, kills small animals once in a while, and makes horses sick but does not kill them. Acting upon his advice, I obtained from the spinal fluid of a horse which died in Baltimore county a pure culture of an organism, which Dr. Stokes found killed rabbits, and which we found killed a horse. The same organism which we found in the spinal fluid of the first horse was found in the spinal fluid and organs of the horse and smaller animals. The symptoms produced by inoculation are the same as those seen in horses suffering from the disease, though in a much slower form than is generally recognized, namely: rise in temperature, then a fall in temperature; inability to move one hind leg, then the animal gives away behind, falls, and is unable to get up any more. He eats all right up to near the end; but this is only one horse and not much can be said upon one experiment—I give it for what it is worth, and Dr. Stokes will show you the specimens. You will observe that it is a short bacillus rather than a diplococcus.

The symptoms of this disease in horses are as follows: They are at work as usual; they are either put away at night all right or they may lag a little in their work. The next morning they are found down and unable to arise. They continue, as a rule, in this way until they die, sometimes living a couple of days and sometimes a week. Sometimes there seems to be a paralysis of the muscles of deglutition and sometimes they eat and drink for a good while, or nearly up to the time of their death. It has been supposed that weeds of different kinds had much to do with the disease. This is very problematical and has never been proven. Whatever the disease is, it is extremely fatal. It affects horses in the stable and in the fields in winter and summer but probably it is more prevalent in summer than in winter.

Dr. Stokes: I will say in regard to the specimen, that I have a pure culture of this organism under the microscope and would be glad to show it after the meeting. In regard to the investigation which we undertook together, of this disease among horses Dr. Clement has spoken of the gross anatomical appearances. In the first place, this disease has been known as cerebro-spinal meningitis, but both Dr. Clement and Dr. Welch failed to find the gross anatomical lesions of that disease. We made a number of sections from the cerebrum, medulla, and cerebellum of the animals. There was no inflammatory condition of the meninges, that is, the membrane which covers and invests the brain. The

meninges were perfectly normal, and seemed to prove that in these cases at least, there was no cerebro-spinal meningitis. Two rabbits were inoculated with bits of the medulla in order to see whether the disease was rabies, as this had been suggested. One animal did not die of the injection of this preparation and another died in 24 hours. It was certain that this was not rabies as the animal died of an accident during the operation. The culture spoken of was taken from the spinal fluid of the horse and inoculated upon a nutrient material called agar. I will not make a technical description of the organism at this time. It is a short bacillus and not a diplococcus, although it sometimes arranges itself in pairs as a diplococcus. The organism was secured as a pure growth and inoculated into the circulation of a rabbit, and the animal died in about a week. A pure culture of this bacillus was secured from the tissues and organs of the rabbit and from the blood; so we regained the organism injected We injected this into a second rabbit which died in four or five days, proving that this organism is able to kill rabbits. A pure growth of this organism was also injected into the circulation of a horse, the animal died in about ten days, and pure growth of this germ was secured from the organs, the spinal fluid and the blood of the horse.

I do not mean to make an announcement at this time that we have discovered the organism of this disease, but I think we have a clue to it. We wish to gain the sympathy and support of the medical profession and of your members in this investigation; and I think we may be pardoned for not speaking further now.

Most of you are familiar with the Pasteur method of inoculation. He found that by weakening the germ of splenic fever or anthrax and then inoculating this weakened germ into the medulla he could prevent a further outbreak of the disease; that these animals could no longer contract fatal anthrax, and in this way he prevented a great deal of anthrax throughout France. He performed this operation at a State fair, and several weeks later, with strong germs, he inoculated another set of animals, and found that the animals which had been inoculated first with the weak germs and then with the stronger ones all lived, whereas, the animals inoculated directly with the strong germs all died. That demonstrated to the members of the laity that it was possible to save their animals. I do not mean to say that we can perform similar experiments, but the probability of such beneficient results is being considered, and we present this work at this time in order to gain the sympathy of the association in a promising work.

HOG-PENS AND SLAUGHTERHOUSES IN TOWN.

Dr. S. S. Maynard, Health Officer of Frederick.

I am present to submit this paper on the subject of "Hog-pens and Slaughterhouses in Town," at the solicitation of Dr. Fulton, who has called my attention to the fact, that there is nothing so far in the proceedings of the Association treating specifically upon the matter.

That the regulation of hog-pens and slaughterhouse nuisances in the towns of the State has an important bearing upon the result of municipal sanitary methods, is evident. If filth, as all our scientific knowledge tends to prove, is a promoter of disease, then we have no more potent sources of contagion and infection in the communities of this State than the average hog pen and slaughterhouse.

My experience of several years as the Health Officer of the city of Frederick has taught me to know this, and inspires me to speak forth as emphatically as I can in behalf of the common welfare of the people, whose health, and frequently whose life, is endangered by the contamination of air, food and water, from the proximity to dwellings and highways, of decaying vegetable matter and animal excrement.

First, I shall cite conditions such as I have seen in my own city, and such as I believe to prevail in the towns of this State generally; and then I shall offer such suggestions as have occurred to me for the betterment of our present condition. I shall speak along these latter lines, not only as a physician, but as a citizen, for it is as the citizen vitally interested in the welfare of his fellow-men, that every member of the community should be willing to co operate in these measures of sanitary reforms. Supporting an accredited population of ten thousand in an area of one square mile, Frederick is, I believe, the most compactly built town in the State. Except in the extreme suburbs there are few large yards, and only a few small garden lots. Yet in this city, where economy of space has been so generally observed, there are about two hundred hog-pens, in many of which swine have been born and bred for a period of fifty years, upon identically the same spot of ground, sometimes in such close proximity to adjoining dwelling that it has been necessary to close both doors and windows in torrid seasons, to exclude the odors from styes, swill barrels and garbage utensils. The saturation of the soil with the refuse and excrement from these pens during this long period of time has gone constantly on, and in a town where surface drainage prevails, it may well be imagined that the hog-pens have contributed no small share to the consequences of insanitary conditions. I must say that, either through the intervention of Providence or the vigilance of the authorities, out-

breaks of infectious disease have been few and slight. There has been none during my present term of office, and I am not prepared to say that even such cases of typhoid and other zymotic disease as have occurred, could be directly traced to this source of contamination. I say this much in order to correct any erroneous impression that may be received from my strictures on the hog-pen nuisance, as indicating that Frederick may be an exceptionally unhealthy city. On the contrary, it is an exceptionally healthy city, as its vital statistics will show. At the same time I would not be understood to say that hog-pens are not an unhealthy element in the environment of a town. I believe them to be unhealthy and unsanitary to a large degree. I attribute Frederick's escape from the conditions forced upon her by those who maintain these nuisances, to vigilance in enforcing the ordinances by which the raising of hogs within the corporate limits is regulated, to the healthy location of the city, and its pure air and water. In my city, the regulation of hog-pens by municipal ordinance has proved almost futile by reason of inoperative character of the laws that have been provided. Section 10 of an ordinance providing for "The Better Preservation of the Public Health," reads:

Sec. 10. No pig-pen shall be built or maintained within the limits of this city without a written permit from the Board of Health, nor within one hundred feet of any well or spring of water used for drinking purposes, nor within fifty feet of any street, nor unless constructed in the following manner, viz: The floor or floors shall be paved with asphalt or with brick or stone well laid in cement or with some other impervious material, and shall be drained and kept thoroughly cleansed and purified at all times, and disinfected once in every 24 hours, and all offal, garbage, refuse and unwholesome or offensive matter shall be removed therefrom and from said premises at least once in every week, in the manner provided for the removal of manure or other noxious matter in section eight of this Ordinance.

It will be seen at once wherein resides the inoperative character of this provision. It is impossible to enforce the letter or even the spirit of these regulations. I believe this clause is a fair example of all such ordinances in towns where hog-pens are allowed to be kept within the corporate limits. Notwithstanding the vigilance of the health officer there will occur instances of violation. It is impossible for the class of people that raise hogs to obey these injunctions. They cannot remove the offal, and they plainly tell you so. It would be imposing a hardship to compel them to abide by these provisions, and I have yet to see a corporate body in a small city sufficiently courageous to

enforce the drastic measures that they or their predecessors have seen fit to adopt.

When neglect of these specific sanitary ordinances becomes so great that action is forced upon the authorities through the direct appeal of an indignant populace, there is left to them recourse to the State authorities. I am able to illustrate this point with a citation of the case of the State Board of Health versus Shafer and others, decided at Hagerstown, a case in which the hog-pen nuisances became so great, and local authority so helpless in the face of the determined opposition of the hog-pen owners, that litigation was resorted to. Fortunately for the interests of public health, the cause of sanitary betterment scored a triumph, and it is important that the clear and cogent reasoning of the presiding judge upon these points should be cited here. Judge Stake said:

"Of the first class are the cases against Broy, Fairfax, Shaffer and Feigley, who are each charged with maintaining hog-pens. Without stopping to consider the weight of the evidence on the part of the State as to the bad sanitary condition of these hog-pens, with the evidence in contradiction, it is sufficient to say that the evidence is sufficient to establish the fact that the presence from day to day of the excrements of such pens, or of the ordinary swill used in feeding swine, is productive of the propagation of disease germs in such number and of such virulence as to seriously affect the health of a city or town. Unless, therefore, the swill used in feeding is entirely consumed, and the excrements removed to some safe distance from the town daily, or more frequently, it is difficult to perceive how swine can be reared or fattened within the limits of or adjacent to the town without such pens becoming such nuisances as it is the declared policy of the law to abate."

We have here an exposition of the nuisance resulting from the maintenance of hog-pens that is characteristic of all such in all the towns of Maryland. They are a terrible nuisance. They are a *nidus*—an incubator—if you please, of disease germs which, swiftly propagated, sally forth to permeate the water, the air and food with elements dangerous to the health of man. This danger is far-reaching. It exists not only in the excrements that gather there, and saturate the soil, polluting springs, wells and the local avenues of drainage, but there is an added danger even more seriously to be reckoned with from the decaying vegetable matter that stands in swill barrels and garbage buckets, throwing off poisonous effluvia to an extent which a thoughtless populace seldom realize. Not only are they propagators of these direct evils, but they exercise indirect influence endangering public health. One of the greatest is the unhealthy character of the meat of hogs so raised for home consumption of the people. Penned in his narrow confining walls from the time he is purchased as a shoat until he becomes fattened for the butcher's

knife, the town-bred hog shares no opportunity with his country cousin to supply his natural and constitutional dietary with those succulent roots and herbs that his sensitive animal instinct teaches him are essential to his proper growth and development. The country-bred hog shows a firm, sweet and solid flesh, and an abundance of healthy fat. The town-bred hog, fed upon swill and offal, then stuffed with corn and surfeited with bran, lacks every element essential to health as a meat and fat producer. He is butchered, marketed, or reserved for home consumption, and thus in his entire career contributes to the deterioration of the public health. Why cannot those who persist in raising hogs beneath the nostrils of their fellow-citizens realize this? Why cannot they be taught to see that, even as a question of economy, it is cheaper to buy meat than to raise it, notwithstanding their protest as poor men that the hog is the poor man's savings bank? The whole question is one of patriotic citizenship as much as anything else, of loyal interest in the public welfare, and as such it should be appreciated by one and all.

The regulation of the slaughterhouses in towns and cities, so far as my experience goes, has been more effectual, but there is still a great deal that could be said upon the point. I have found it always advisable in dealing with the owners of these, as with the owners of hog-pens, to confer with them, and suggest, explain and mollify, rather than to anger, exasperate, and correct into obstinacy. When I found that the ordinance of Frederick, prohibiting the maintenance of hog-pens adjacent to slaughterhouses, was being generally disregarded, I summoned all the owners of these establishments by courteous invitations to meet me at the City Hall. Every man of them was there, or sent a representative, and I fully explained the law and urged their co-operation. They willingly agreed to obey a measure that applied to all and allowed no one an undue advantage over another. Every hog-pen so maintained was promptly abandoned. Dozens of hog-pen owners of the other class have told me that they would willingly abolish their pens if the law so directed, but that they would not do so unless the rule was made general. I believe that is the spirit that prevails throughout the State.

But of the slaughterhouse nuisance, that which presents itself to me as the most harmful, is the custom of disposing of entrails to indigent whites and blacks, who carry them to their homes to partake of themselves or to feed to their hogs, dogs and chickens, leaving considerable portions to decay upon the premises.

In cases where hogs are raised by butchers in pens adjacent to slaughterhouses, it was once the custom of our butchers, and may yet prevail in some parts of this State, to sweep the fresh blood from the slaughtering-floor directly into the adjoining pen, dumping there also the remaining offal. Such methods of dis-

posing of slaughterhouse offal are sufficient to strike terror to the hearts of those who know the importance of sanitation.

One of the greatest incentives to cleanliness in the maintenance of slaughterhouses is local competition. A butcher realizes that the success of his business depends to a large extent upon the cleanliness of his shop. It would not do to offer any ground for a rival to boast of greater merit in this regard. Thus the question of cleanliness in slaughterhouses partly regulates itself; but even with this it is far from the spirit of sanitation to allow any of these to exist within the limits of a town.

So far I have pointed out the evils. It is now within the province of this paper to suggest the remedy. The impracticability under the present laws of suppressing hog pens and setting slaughterhouses beyond the corporate limits of a town has been shown. An appeal to an intelligent and law-abiding people ought to prevail, but when it does not, there are two remedies left—either bold, prompt, effective, municipal legislation, absolutely prohibiting the maintenance of either nuisance after a stated period, allowing ample time for all to provide themselves against the loss of their premises; or an Act of the General Assembly regulating the question for the whole commonwealth. In view of the fear of public censure that restrains Town Councils and county authorities from creating and executing such radical measures, legislative enactment as a last resort should commend itself to every sanitarian, certainly to every lover of his State who desires to see its public health preserved and its sanitary standards so high that none will dare assail. I trust to the co-operation of the people of every community for such a result, and I hope that this body will not rest until the evils that confront us have been corrected.

DISCUSSION.

Dr. Stabler: It seems to me that perhaps the most important question that has been brought before us in these papers is the one of tuberculosis, inasmuch as all physicians know that there is a higher mortality attending that disease than any other single disease that can be traced to domestic animals, and yet the State Veterinarian, Dr. Clement, thinks that no law is needed upon this subject. Upon that point I beg leave to differ with him. I think we should have a law upon tuberculosis that will not leave it to the personal interest or judgment of the owner of a herd of cattle whether they shall be destroyed or not. I do not believe the intelligence of the farmers of the State has reached that point yet at which a man will say that it is to his own interest not only to get rid of those infected animals, but to absolutely prevent the spread of the infection

further, and I believe that nothing less than State laws will stamp out this disease, which, according to the State Veterinarian is on the increase. I happen to know of a case in my county where a farmer lost one or two of his animals with a wasting disease. He had our local veterinarian to come and look at the stock, and he was told that some of the animals were tuberculous. Those animals were sold to a cattle dealer, who by the way, happens to have been one of those appointed on the State Live Stock Commission. The animals were brought to Baltimore and sold again and when this dealer was taken to task by the veterinarian, he said: "Yes, I buy all of that kind of animals I can get, and I shall continue to do so until some State law prevents it, and I think the sooner the public finds it out, the sooner we shall have a State law." This man is a large dealer in such animals. I think we need to recommend the passage of such a law as soon as possible.

Mr. Hartshorne: The sanitary inspection of cows, as conducted in regard to dairies, in some places is I think rather perfunctory. Washington city has a law forbidding any dairies to bring milk into the city except from herds that receive license from the city authorities, and I know of a case of a large herd in the upper part of Montgomery county, consisting of perhaps from sixty to one hundred cows, the owner of which made the statement that the inspector came from the city, looked over them, said, "you have a very nice herd, it seems to be in a nice, healthy condition," ate a dinner with him, and went to look at another herd, asked a few questions about them, and as they were healthy in appearance also, gave licenses in both instances. I was not present, but accepted this statement from the owner of the cattle. In another case a veterinarian living in that section was appointed to make an investigation. His investigation was very thorough. He examined carefully every cow, and no cows were passed that had anything the matter with them. This was not altogether satisfactory to some of the people; some of the cows which they thought were all right, did not pass the test, and they demanded another veterinarian who made the examination a little easier, and he passed the herd. Now I do not know that they would have been decided tuberculous by the tuberculin test, but some of the cows that had the appearance of being tuberculous. They had the slender, delicate look, that in the human being would be called tuberculous, and I would feel better satisfied in my own mind if we had a compulsory tuberculin test for cows. I think, as Dr. Stokes has said, there should be some law in regard to that.

In regard to rabies, we have had considerable excitement in our section over that subject, and I think we know all about it now. We can tell as soon as we see a dog whether he is mad or only

indignant. If he is mad, his tail hangs loose, and if indignant, it sticks stiffly out, while if frightened, it droops between his legs. If we see him in the distance and his tail hangs loose, we jump a fence or climb a tree. I brought the question before our Board of Health, when rabies first started in our neighborhood, whether we could not compel those persons who had bitten dogs to have them killed. Of course I do not mean that any person bit a dog or that we wanted to kill any persons. We were all more or less affected with rabies, and we felt that there should be some law on the question. There was one family of dogs known to have been bitten, but the owner declared that they were not. He was a colored man living with two or three dogs on a place, the owner of which had also a half dozen dogs, and he was satisfied that nobody on the place was rabid. I cautioned him to put the dogs up. He did so, but in about two weeks one of the dogs broke out of the pen, and bit every dog on the farm. They were all killed, and all the rest of us began immediately to improve.

Mrs. Fendler, New York: If you will allow me to give some experiences of my own in the New York slaughterhouses, I would like to do so. I am a member of the Ladies Protective Association, and I have the honor to be the first Chairman of the Slaughterhouse Commission. The slaughterhouses of New York were at the time in a most frightful condition. The traffic was carried on in little wooden buildings, which were saturated with blood. Dr. Peters was with us in the work, and we argued with the butchers without effect. We complained to the Health Department which would not take up the question, so in 1885 we introduced bills into the Legislature, and then the butchers concluded that it might be better to come to an understanding with us, because they felt that we were going to do something. We had a joint meeting with the butchers, and they promised to do all that we required. We pointed out some things in the way of improvements; for instance, asphalt floors that could not become saturated with blood. They had been in the habit of putting out meat on wooden racks, exposed to flies, and we objected to that. There was one fertilizer establishment that gathered bones from all the butchers and worked them up into fertilizer. We fairly drove him out of business. The butchers declared that it was too expensive to fix their buildings as we wanted them to, but decided that they would combine, secure a block and build an abbatoir. As the children went to school, they used to stop in front of the old slaughterhouses, to see the process of killing. We objected to that exposure, because it was brutalizing. They built their new abbatoir with beautiful marble floors, put in special chilling rooms filled

with ice, and it is now really a pleasure to go through these establishments, and see how the meat is prepared and kept.

The offal used to be in a most frightful condition.. They had the manure dumped next the slaughterhouses, throwing part of the offal on the same pile, and sending part of it to one of the islands to be burnt. Now they have a special place for burning or drying it, and very little odor comes from it. The whole work is done under the same roof. The bones are worked up on the same day the beef is slaughtered. The improvements are so great, that the butchers thank us for it, and acknowledge that they make a great deal more now than they did by their old methods of butchering, as they now ship beef abroad as well as supply their home market.

I have here also a table showing the rate of mortality in the region of the old slaughterhouses as compared with the rest of the city.

Dr. Welch: I think this is a very good illustration of what women can accomplish when they begin to participate in the work of hygiene. We are very glad to have this admirable illustration of their work, and hope that women will participate in what is to be done here. I had known something of the work accomplished in New York, but had never had the pleasure of hearing of it in detail, and I am sure we are all obliged to Mrs. Fendler for this explanation.

Dr. Smart: I did not understand Dr. Clement to oppose a State law, but I did understand that while we should have a State law, the cost of it should be borne directly by the individuals. We may talk as medical men, and as an association of public health officers, about educating the public to do various things, but I think that the best educator of the people is law. We may say that it is bad to expectorate in the street cars, and advise against it but if you pass a law and fine the first man or woman five dollars for doing it, it will have more effect than all our advice. So I think we should draft some laws for the coming legislature, and let each member of this association secure the interest of the member from his district in their passage. We shall do more good than will be accomplished, if we stop at discussions.

Dr. Abbott: I should like to suggest, that legislation concerning this particular point should be a little broader than that relating to any specific disease. The gentlemen who have preceded me have left the idea on my mind, that tuberculosis is presumably contracted from the milk of animals having consumption. I am not sure that this is so. I recall a case in Pennsylvania some time ago, of a man who had a magnificent herd of twenty-two Jersey cows subjected to the tuberculin test, and he

decided to have them slaughtered, notwithstanding the fact that his neighbors laughed at him. I was one of a committee to investigate this case, and say whether they should have been killed. Seventeen cows showed the presence of the disease. Guinea pigs were inoculated with the milk, but tuberculosis could not be found in the animals afterwards. So there is some doubt about the infection from milk. As it is a doubtful question, I think the legislation should provide for the tuberculin test, and that animals giving positive result, should be isolated. I have recently interested myself in this question in Philadelphia, and I have tried to get some idea as to what was the normal condition of the milk coming into that city. When you think of the quantity that comes there, you can understand that I have not done much yet towards solving that question. It is impossible to examine every sample of the enormous quantity of milk coming into the city every day. I divide the dairies into three grades, one that the milk inspector regards as the very best dairies, another containing the worst dairies, and the main group we will decide after finding out which are the best and the worst ones. Without going into details of the examination of these milks, I have here figures, quoted from memory, of thirty-seven samples. Of the thirty-seven, seven fell below 20,000 bacteria per c. c; one below 10,000, eight were above 100,000 per c. c., and one over 500,000 per c. c. In no instance was it possible to detect the specific bacteria of any dangerous group, but when we consider the food stuff containing so many micro-organisms, undergoing changes that might infect a person of poor health, the products of fermentation might most certainly result in danger to the child or the weak adult. I believe we shall come to the bottom of the trouble, if we legislate on these lines. I think there should be a law requiring a special license of every man keeping a dairy. There should be a law insisting upon a special license for every man keeping a small milk shop in the city. There should be properly trained and competent inspectors to visit the milk shops and dairies at proper intervals, and see that they are kept in proper condition. This matter should be presented to the legislature, and I believe it will be ultimately successful.

Dr. Rurah: The subject of pure milk in the cities is one that attracts everybody interested in children and the feeding of children. I think it might be well to call before the association the work that has been done in some other cities in recent years. In Newark, N. J., a combination of several of the dairyman put on the market a milk which was under the inspection of experts hired by the dairymen themselves. This certified milk was sold to the people at a slightly advanced rate. This work has also

been carried out in Rochester and in Buffalo with very good results, and I fail to see why it cannot be done in this city.

In regard to rabies, I have had some experience with this disease within the last eight months, and have examined, with Dr. Keirle, quite a number of dogs. We found in the cases bitten in Maryland, that sixteen of the dogs were proven to be rabid. I merely add this to show the general prevalence of the disease in the State.

Dr. Mitnicht: As to the question of milk inspection in this city, I believe the city is pretty well supplied with necessary laws, but that the great difficulty is in the inadequacy of the force to examine the supply. You can very readily see this when you consider that we have but one or two inspectors, while the supply comes in at seven different depots. When the milk law was passed, it was not done so much, I fear, for the purpose of providing an efficient law, as for the purpose of making offices for some favorite men. Two men cannot inspect the milk supply at seven different points, and also examine the milk on the streets. The proper thing to do would be to secure the appointment of at least five more milk inspectors. One for each of the stations might accomplish something. The farmer shipping his milk would not take the same chances then, because he would be more likely to be caught if he sent in a prohibited article. Now it is an easy matter for him to do so. If there was an inspector at each station, the dairymen would have to be honest or stop shipping altogether. So far as the license is concerned, I think it is a good idea. I believe Dr. McShane has recommended that before.

Dr. Stiles: I have only one word to say in closing. I waut to express my intense admiration for the man who is buying up all the tuberculous cows in the State. He is ridding your State of the disease as fast as he can, and if he will continue that, you will be in a way of solving your problem. Of course, that is all on the supposition that you have a proper meat inspection law.

Dr. Clement: I have nothing to say in conclusion except that the doctor misunderstood me in saying that I did not recommend state legislation on the question. I do recommend that but I believe that the people should pay the bills directly.

Friday, *November 19th*—Afternoon Session.

The meeting was called to order by the president, at 3.05 P. M.

Dr. Welch: The subject for our consideration this afternoon relates to the public schools, a subject of very great interest, not only to the physicians, but to the general public.

The first paper on our progamme is one by Dr. W. Dulany Thomas, on "Sanitary Condition of the Public Schools of Baltimore." Dr. Thomas is ill, but he has sent his paper. It is well known that he has given much time to the study of the sanitary conditions of our schools, so I call upon the secretary to read Dr. Thomas' paper.

THE SANITARY CONDITION OF THE PUBLIC SCHOOLS OF BALTIMORE CITY.

Wm. Dulany Thomas, M. D.

At the annual meeting of the Maryland State Homœopathic Medical Society, held May last, it was my pleasure to report the result of a sanitary inspection made by myself of certain of the public schools of this city. I was led to make these investigations through the frequent complaints made by some of those subject to the deleterious influences arising from unsanitary conditions, and after being informed that efforts upon their part to correct them were without result. Time did not permit an inspection of all the schools and annexes, and only those convenient to my other engagements were visited. It is therefore fair to suppose that the conditions discovered are but examples of the rest.

It is not the purpose of this paper to reiterate minutely the facts heretofore to the attention of the public, and I will therefore content myself in the presentation of a brief paper for your consideration.

I must admit that the want of proper sanitation far exceeded my expectations, and I was surprised, as were doubtless many others, that the lives of teachers and scholars had so long been put in jeopardy. I feel assured that if intelligent parents had appreciated the unhygienic conditions to which their children were subjected, a unanimous movement before this would have been made by them for its relief.

My attention was largely given to the outhouses attached to the schools. Without exception these were found to be most unsanitary and deserving of condemnation. In one instance it was the usual occurrence for the urine trough to overflow, and its contents to course their way to the street outside; and in another for the cess-pools of adjoining property to drain into the school-yard. How many other schools are so afflicted I cannot say, for as before stated, my observations were limited.

Many, if not all, of the facts given at length in my former paper had been brought to the attention of the proper ones in authority, but without avail. I trust the dawning of a day of improvement is upon us.

I call particular attention to the overcrowding which exists in many of the schools. Rooms arranged for forty pupils are made to accommodate sixty and seventy, at the expense of the health of both teachers and scholars. Proper ventilation is not possible in many instances owing to the close proximity of water closets, and the methods employed for changing the atmosphere, which is that of lowering a window above the head of some child who suffers thereby. Added to the deleterious effects of overcrowding and insufficient ventilation, the child undergoes a system of intellectual "cramming" which increases the blood impoverishment brought about in the first instance, and renders an inherited weak constitution an excellent soil for the implantation and development of certain diseases, notably those of diphtheria, scarlatina, tuberculosis, etc.

With such lax hygienic regulations, it is not surprising that outbreaks of diphtheria and scarlatina, etc., are of no uncommon occurrence. One of the schools visited by me was just recovering from an epidemic of diphtheria; and although of comparatively recent structure, possessed a most unsanitary cess-pool, consisting of a hole dug in the ground, resembling the country earth-closets.

For the prevention of epidemics the most stringent regulations are necessary on the part of the teachers aside from the sanitary condition of the schools. Every teacher should be familiar with the symptoms characterizing the first stage of the principal zymotic diseases, and be able to diagnose approaching scarlatina or diphtheria by the appearance of the throat. Should a simple pharyngitis be mistaken for one of diphtheria, no harm results, and the error has been made on the side of safety. Diphtheria is known to be a localized disease. When inoculated subcutaneously into the bodies of susceptible animals, the bacillus of diphtheria does not cause septicæmia, as is the result of inoculation with other organisms, but remains localized at the point of injection, there producing the manifestations of the disease. This being true, the interpretation of the process is not difficult, and we can but infer that the disease is due to the production of a soluble poison which the bacteria develops at the seat of inoculation. Now, the seat of inoculation from exposure to the diphtheria bacillus is almost invariably the tonsils, thence spreading to other parts. Like other organisms, a favorable soil is preferable for propagation, and this is to be found in a tonsil previously enlarged by tonsillitis, or a simple hypertrophy, the result of excessive growth of lymphatic tissue. Parents do not appreciate the dangers to which their children are subject by inattention to throat disease, and even positively refuse proper treatment when advised by their physician. It therefore becomes imperative that the parents of children having diseased

tonsils be advised, as is the plan now adoptod in opthalmoscopic examinations. Proper care on the part of teachers, attention given by parents to the instructions offered, and the whole governed by medical inspection, would accomplish much toward decreasing the mortality of the zymotic epidemics.

Given a case in which scarlet fever or diphtheria has occurred consecutively in one school, it should become imperative on the part of the health commissioner to order a disinfection of the school building and its contents, together with the detention at home of all scholars resident in affected homes. Parents should be advised on the back of the certificate, to be signed by a reputable physician and returned as soon as the house is free from infectious disease, of the duration of the incubative stage of the various zymotic diseases, thus giving to intelligent parents an insight as to the importance of not allowing a return to school of other members of the family too soon—an error often committed on the part of some over-indulgent physicians.

For the prevention of the spread of infectious diseases, cleanliness is pre-eminently important. The result of my inspection showed conclusively that the school-rooms were not in this respect properly cared for. Floors are washed but thrice annually, and inside painting not done until absolutely necessary, as a consequence of which many of the rooms have a besmeared appearance. In this age of enlightened civilization, when micrococi, bacilli and spirilla are freely acknowledged to be an important factor in the causation of disease, it seems almost criminal that such a condition should be permitted to exist. When we think of the motley crowd of children which attends our public schools, and the unhygenic homes many of them represent, it behooves us to be on the alert. Floors should be washed once weekly, and walls and inside work painted at more frequent intervals than is now observed; together with the use of the proper disinfectants, such as the formaline disinfector of Schering.

Electric fans should be so operated as to cause change of atmosphere; and the present system of pulley ropes for windows superseded by some of the more modern appliances. Flush-tanks should be used in place of the old style closets now in vogue, and the Smead system of disposing of waste matter abolished.

To govern all this, together with the sanitary and other conditions of the public schools in general, a sanitary inspector should be appointed. He should not be burdened with the care of any buildings other than that of the public schools, for in them will he find sufficient to occupy his attention. Not only then would the sanitary condition of the buildings be properly cared for, but his duties could also be extended to the inspection of suspected

infected children, and follow up such cases of disease existing in the homes of the pupils as required attention. Thus would be done away much of the danger due to the early return to school of children from infected households, for none would be allowed re-attendance, until receiving a properly certified report from the sanitary inspector.

It is to be regretted that the communication made to the school commissioners last May, when the sanitary condition of the public schools was laid before the public, should have received so little attention from that body, and a hearing have been denied to the committee by whom it was presented.

If any reason exists for the supineness and indifference exhibited by the school commissioners upon a subject of so vital importance, to a large and helpless body of the inhabitants of our city, it has not been made apparent; and public sentiment must soon demand that the responsibility resting upon the board be fearlessly and faithfully met.

It cannot be doubted that a matter of so great importance if presented to the City Council for the purpose of obtaining the necessary appropriation to correct the evils complained of would be approved by every citizen; but consistently with a seeming purpose to refrain from taking any steps in the premises, the commissioners have not in any form presented the subject to the City Council.

Notes Upon Inspections, Reported in May, 1897.

Primary Colored School No. 4.

Biddle Street, near Pennsylvania Avenue.

The location of this school is far from being salubrious, situated as it is between a sewer in front and an unclean lot behind.

The ventilation of the school is very imperfect. The attempt has been made by ventilators built in the outer walls to give exit to foul air, but they fall short of their purpose.

The lot in the rear of the building is city property. In one corner stands a wooden structure which seems to be a storehouse for wood. The city permits not only the dumping of horse manure, but the lodgment of garbage-carts, and from time to time of empty barrels, the property of some odorless excavating apparatus company. This odor, with that of horse manure, which has been spread broadcast to-dav, renders the atmosphere so intensely disagreeable as to prevent the lowering of the windows for the purpose of ventilation. Complaint was made to one authority regarding the objection, and the only answer given by this official was to the effect that the smell of stables is healthy.

The yard of this school lies some eight feet or more below the level of the lot above described and the adjoining property. Running back and forming a portion of the school fence is the yard of some small houses situated on Stone street. Frequently it is observed that the water-closet in the yard adjoining overflows, causing the fluid to run down the school wall. It is said that this privy has been emptied but once in the past five years.

The building is so arranged that one corner comes almost in direct opposition with the privy used almost daily by hundreds of children. Between the windows of this particular class-room and the privy there is a distance by actual measurement of about ten feet, and of all odors which come from a cess-pool, those which arise from this one seems to be the worst. The privy is surmounted by what is supposed to be a ventilator placed at a height corresponding to the windows of the school-room, and distant from them about fifteen feet. The closet has no cover for the seats, and the diffusion of gases has free vent. For the use of the boys a long trough is employed. Although the waste-pipe from this trough is a four-inch pipe there is some defect in its construction, which allows the urine to dam back and overflow the trough. This being the case its only exit is down the sides of the trough. It is a usual occurrence to have this overflow course its way down the gutter of the school-yard to the street. This overflow occurs while the yard contains nearly four hundred boys, who, in their wild play, tread often in this stream of urine and carry it with them to the school-room.

Grammar School No. 5.

Greenmount Avenue and Eager Street.

No special complaint can be given of this school, so far as my inspection was carried. The rooms were last painted in 1889. Privies are without covers to the seats and without water in the troughs. Light good, and ventilation conducted upon the general principle of unheated shafts.

Grammar School No. 6.

Division, near Lafayette Avenue.

In some respects this school was in the best condition of any visited. Flush-tank in teachers' toilet room with ventilated soil pipes. In portions of the buildings, a very artistic display of colors is given on the walls, which shine out behind a dirty face in a radiance of pea-green and purple. The walls generally are filthy and need renovating badly. Privy is placed very near the school building, covers to the seats, but the water is in the trough,

Grammar School No. 8—Primary School No. 30.

Hollins Street, near Fulton Avenue.

Grammar School No. 30 is a modern school, and was built in 1890. The Smead system of ventilating and heating is employed, and it is said to be successful so long as the janitor uses brains with his fuel. No special complaint can be given of this school. Its neighbor, No. 8, however, compares very unfavorably with it. In the rear of the building are apartments used as cloak and toilet rooms. The stationary wash-basin in one of these had apparently overflowed. This led me to make a more careful examination of it, together with its attachments, and a most deplorable piece of sanitary plumbing was revealed. Instead of running the waste-pipe from the basin to the yard, where the water could be discharged, it was found connected with the privy-vault, thus serving as an excellent ventilator to the vault, with nothing to prevent a ready entrance of gas to the adjoining schoolroom. A short time previous to my visit to this school a basin in an adjoining room was in a similar condition, which was remedied, but the one of which I speak was left to endanger the lives of many hundred pupils and a dozen or more teachers. This defective piece of sanitary plumbing may be seen in the branch of Female Primary School No. 30. Privies are without covers to the seats. This is the only school where water was employed to flush the urine troughs.

Grammar School No. 16.

Clement and Hull Streets

This school built 1881, was occupied only as a male school until about 6 years ago, when the upper story was completed for the accommodation of female pupils. I am informed, that since its occupancy, the walls of the school rooms have been cleaned or painted, but once, (16 years.)

The ventilation is by means of a shaft placed in the outer wall, not usually heated, and hence next to useless.

An examination of the water-closet in the yard, revealed a direful state of affairs. The vault, a most primitive structure, is an excavation of about 6 feet deep, with a curved bottom, and lined with brick or cement. At the time of my visit to the school, I was informed, that vault contained about a foot of fecal matter, and had been cleaned about 3 months before. I asked the question as to how often the privy was excavated, and was told, "not until the fecal matter almost fills the vault." Along the side this filthy hole run two troughs at right angles to each other, their combined length not exceeding ten feet, to serve a school consisting of 360 boys. A horrible odor emanates from this trough. No attempt is made to flush or disinfect.

GRAMMAR SCHOOL No. 21.

Gilmor and Presstman Streets.

This school has been the source of much complaint for many years past owing to the impracticability of securing good ventilation in portions of the building. In the year 1886 or 1887 the school, becoming overcrowded, it was proposed to build an annex for the purpose of accommodating the excess of pupils. The building is so constructed that the addition proposed could have been built on either of its four sides, but the School Board conceived the idea of building two large rooms, each with a seating capacity of more than fifty, directly over the outbuilding used as a closet. Not very many years ago complaint was made by a teacher concerning the horrible odor which proceeded from the vault. Her plea was made to one who had power to act in the premises, but this gentleman replied "that it was all airs upon her part."

Since the construction of this annex, ten years ago, no teacher has occupied this room who has not had one or more attacks of illness, more or less severe. This you may say was a mere coincidence, but, upon transfer to another portion of the building, their health improved so markedly as to leave no doubt that the constant inhalation of the vile gases was a most decided menace to health. It is claimed that the pupils occupying these rooms are drowsy and less capable of giving proper attention to their studies than the students in portions of the building remote from the vault. So pronounced is the effect upon the children that complaint is made to the teachers of the odor, more or less great, every time the attempt is made to ventilate by opening the windows.

An attempt has been made to ventilate these rooms by ventilators connected with a shaft, at the bottom of which a fire is kept burning daily. This no doubt has to some extent remedied the evil.

About a month ago I reported the school to the commissioners through the kindness of Dr. Jno. T. King. At my visit to the school May 4th, I noticed workmen had commenced work that day toward improving the defect. But how? By moving the vault from the yard to the cellar!

GRAMMAR–ENGLISH SCHOOL No. 1.

Druid Hill Avenue, near Biddle Street.

The building has been occupied as a school for the past fifty years, and a most primitive structure it is.

No special system of ventilation is employed. The privy vault, so far as I could judge, is very shallow and, at the time of

the inspection, well filled. No water is used to flush the trough, and both privy and trough are very close to the school building. During the early winter the supply water-pipe to the flush tank burst. But for the goodness of the janitress, who joined a piece of hose to a spigot and connected it with the water-closet, the catch-basin would have until now been without water to flush it.

Dr. Welch: If it meets with the approval of the Association, I would suggest that the discussion upon the individual papers be postponed until all of this series has been read.

SOME OBSERVATIONS UPON THE HYGIENE OF THE PUBLIC SCHOOLS OF HOWARD COUNTY.

By Dr. S. J. Fort, Ellicott City.

In taking up the consideration of school hygiene, especially in the county schools, it is well to preface such consideration with the suggestion that much of the serious condition of such schools is due to causes beyond the power of a school board to regulate without the co-operation of the patrons of the schools and the taxpayers of the county. No matter how wide awake or up-to-date a Board may be, the bucolic mind is still apt to think that what was good enough for children of the past is good enough for the children of to-day.

The people of a county do not keep pace with the march of modern progress except in the matter of sowing and reaping, and when a School Board is left behind in the procession, the combination is what may be seen in too many of our counties at the present time.

From a hygienic and sanitary standpoint the schools of Howard are for the most part just where they were ten years ago. The condition of many is deplorable, and not worthy of one of the richest counties in the State. Speaking from this standpoint, there is not one school in the county in which some fault cannot be found, and many are absolutely unhygienic in *every* respect. A searching investigation made some time since by the State Board of Health brings forward most ample proof of these statements, and only needs reading over to show the pressing necessity of a complete remodeling of at least one-half of our school houses, of providing a pure water supply for every school at present unprovided, a stricter attention to the law requiring vaccination, a closer attention to quarantining children from families in which there are cases of infectious or contagious diseases, and provision for properly disinfecting the walls, floors and furniture of the school rooms.

At present, so far as I can learn, the teacher is permitted to have the school room swept or scrubbed, and incidentally pay for

the service out of his or her own pocket; hence, while it is done sometimes with ordinary soap and water, it is only in rare instances, if ever, that scientific disinfection is practised; and however done, the floor is the only part scrubbed, successive generations of children using the desks from year to year, each year adding its collection of nasal discharges, sputum and general filth to those of years gone by. Those of us who have been county school teachers know only two well what this means, and what dirty animals children are.

A single drinking cup, one solitary brush and comb, piece of soap, wash basin, etc., renders personal cleanliness a misnomer, and hampers the efforts of the teacher to bring about the condition that is said to be next to godliness, at the same time helping along the dissemination of skin diseases and parasitic insects, to say nothing of more serious diseases that may thus be carried from one to another.

In making the investigation already alluded to, the State Board sent out a list of questions to every teacher in the county, and while not all of them replied, enough answers were received to show the condition of a majority, and a tabulation gives results as follows:

Eight schools in four election districts are over crowded.
Ten school lots in five districts are badly drained.
Seven schools in three district are badly ventilated.
Ten schools in three districts have a bad water supply.
Eight schools in five districts have bad out houses.
Thirteen schools in four districts do not require vaccination.
Two schools in two districts do not enforce quarantine.

Our county is also distinguished by being one of nine exempted by law from having more than one privy; a law passed in 1894, providing that every school should have two privies, one for each sex, properly protected from the weather, and perfectly private, specially exempted Howard county with eight others, to the shame of the School Board, that then or ever failed to cry out upon such an outrage on common decency. Notwithstanding this exemption, some of our schools have two privies, but there are many with only one, and as seen by the tabulated returns, ten outhouses are reported as being in bad order.

Summed up, the condition of our schools is this—light, heat, ventilation, floor space, yard space, situation, water supply, school furniture and disinfection of same, is in a condition that demands prompt attention to correct according to the commonest laws of every day sanitation, and demands a combined action by the School Board and the people to bring about these necessary changes so vital to the health of our children. We as parents

owe it to our children, not only to supervise the schedule of work laid out for them, but to demand that the workshops where this work is to be done shall be as comfortable and hygienic as possible.

This can be done; the history of reform in such matters in Massachusetts and other states is accessible to all who are interested. We have a law providing for teachers institutes annually, during which meetings the teachers could be instructed by experts in the laws of sanitation and hygiene; and I may say here that so far as my experience goes the teachers of Howard county as a rule are far above the average, needing only to be shown the way to respond at once; they are receptive, earnest and eager to learn, but as this law has been a dead letter for the past ten years their opportunities for gaining such knowledge has been limited by just so much time wasted. We have a law providing for meetings to be held at intervals for the benefit of the patrons of the schools at which the same information should be disseminated, bringing them into closer touch with the school authorities and providing opportunities for discussion of ways and means to perfect the hygienic and sanitary arrangements of the schools; this law is also a dead letter. The excuse given for the supineness of the School Board is that money cannot be had to work with, but I question whether an appeal to the people would not bring a response in hard cash, just as much as I question whether a parsimonious and non-progressive board is not equally culpable with one that steals the peoples' money; the former is robbing the children of the tax-payers of their birthright, the right to receive a thorough education, and with it to have their health protected by every safeguard known to man; while the other only steals money.

I take it for granted that this right of the children is undisputed, but so long as those entrusted by law with the authority to oversee such matters are satisfied with the present terrible condition of our schools, it is necessary to bring about a closer attention of the people themselves, and exert enough pressure to compel reforms in the hygienic abuses now working a detriment to the public school system of our country, by annually reducing the total of working days of so many children through ill health.

Further detail is not necessary; this appeal or criticism, call it what you please, is put forward at this meeting as an endeavor to aid in a vital reform, and I have faith to believe that it will not fall upon unproductive ground, for surely no man lives in this century actively engaged in school work, who is absolutely indifferent to the needs of the children with whom and for whom he works.

Dr. Welch: In introducing the next speaker, I wish to emphasize our great pleasure and gratification at the introduction of a woman into the proceedings of this association. We shall never attain all that we wish in this work, without the hearty assistance of the ladies. I have the pleasure to introduce Mrs. Mary K. Miller.

REPORT UPON AN INSPECTION OF THE PUBLIC SCHOOLS OF BALTIMORE, BY THE GOOD GOVERNMENT SECTION OF THE ARUNDELL CLUB.

Mrs. Mary K. Miller, Baltimore.

Investigating the public schools was undertaken as part of last winter's work of the Arundell Good Government Club.

As the women comprising this volunteer committee, (except in a few instances,) were not trained sanitary experts, it was thought best to confine their observations to certain points, most obvious to any practical mind, and which appealed to us from the standpoint of health and good housekeeping. The visitors were supplied with individual permits from Mr. Wise and question blanks thought to be helpful.

Our plan was to visit *all* the primary schools, and as many more as convenient, resulting in reports from 49 buildings, including 36 primaries, 5 grammar, 4 annex, 2 colored and 2 English-German. From these reports and statements made by the visitors at the several meetings held by the committee, the following facts were collected and embodied in a report, which was presented to the Good Government Club, in May, 1897.

Of the 137 buildings now in use, 103 are owned by the city and 34 are rented. Most of the rented buildings visited were dwelling-houses, not only not adapted to school purposes, but totally unfit to be so used.

Some of the school buildings, noticeably the *newer ones*, are in excellent condition, and therefore only need brief mention. Large, bright rooms, modern methods of heating and ventilating, cloak-rooms with stationary washstands, and reception and retiring rooms for teachers, are among the modern improvements.

In the old buildings *overcrowding* is a most objectionable feature. Far too many pupils to the air-space of the rooms is the rule throughout the schools, and in some of the buildings the overcrowding is a positive disgrace. For instance, in Primary School No. 20, 102 boys were found sitting on the floor of the teachers' platforms. In Primary School No. 6, 80 children and 2 teachers were occupying one room, and in Primary School No 12, there were 38 children in a room 18 by 17 feet.

In Grammar School No. 10 (where boys occupied the first floor), 300 girls were packed into the second story of an old building composed of eight rooms, about 15 by 20 feet each. These rooms open into each other, with glass partitions, and no corridors between the rooms, making them death-traps in case of fire, and impossible to ventilate.

After the overcrowding, the *condition of the outhouses* seemed the greatest menace to good health.

In the new buildings where modern trap systems are in use, the arrangements may be adequate, but in the old school buildings and in rented houses occupied by schools, the conditions are in many cases positively appalling.

Insufficient accommodation and insufficient separation is common, while close proximity to the school-rooms, and lack of cleaning, makes it impossible to open certain class-room windows, even in warm weather.

Our committee heard of much sickness, attributed to this cause; one case may be cited (Primary School No. 6) where every teacher who had occupied a certain room, had suffered in health, principally from throat trouble; the children also were perceptibly affected, and it was patent to even a casual observer, that the atmosphere was subject to a continual poisoning.

The arrangement for boys in some of the school yards is a disgrace. These troughs certainly ought to be abolished, or if they do remain, they ought at least, to be properly flushed, and made to empty into the cess-pool. In one case, these troughs discharged their contents upon the pavement of the school yard.

The subject of *inadequate lighting* of school rooms, and the effect upon the eye-sight, has been carefully investigated in Baltimore, by men who can speak with authority on the subject, and who will report to this convention; but it does not need the training of an oculist to know that the glare of whitewashed walls, the light, or rather lack of light in basement rooms, and rooms where it is necessary to keep gas burning on bright days, *must* injure the eye-sight and the general health as well.

Provision for the *disposal of wraps* during school hours vary from large and well appointed cloak rooms, to schools having neither halls nor corridors (except the outer one, the rooms all opening one into another), consequently, cloak rooms are unknown, and in addition to stoves and human beings, the heavy wraps, (often damp, sometimes strongly permeated with home cooking,) are piled between the children when sitting at their desks, or hung many deep on pegs; certainly a most prolific cause for the spread of contagious disease, as well as direct danger to children themselves.

Seating of school children *at desks*, properly adapted to them, is (so far as the committee was able to learn) not considered.

Even in the best equipped schoolrooms, there are no adjustable desks, and no effort seems to be made to *adapt* desks to the pupils, even where desks of different sizes are provided.

The usual means of *relieving thirst* is from the hydrant in the yard, and through the winter months, uncovered buckets of drinking water are brought to the class-rooms, with one or two cups for forty or more children. Is not this a fruitful source of contagion? In one or two schools only was it found that each child was supplied with her own drinking cup.

Buckets of water were also in the rooms for wetting sponges and slates. This method seemed to our committee both nasty and dangerous.

Is it not feasible to replace this nuisance with cheap paper and pencils?

The *heating* apparatus found was of various kinds, including the Smead system in new buildings, a few furnaces; one dilapidated cooking stove, and, again and again, rooms were heated with large stoves, surrounded by zinc or tin shields.

These rooms were invariably *ventilated* by windows drawn down from the top on both sides of the room, causing strong draught.

Where furnaces were in the cellar our attention was called to danger of fire from their close proximity to woodwork and from pipes near to wainscoting throughout buildings. If fire should occur, with insufficient fire-escapes, or none, the loss of life among so many young children would be appalling.

As good housekeepers the committee was interested to find that the ordinance for *cleaning* school buildings decrees they shall be swept daily and scrubbed three times a year—at midsummer, Christmas and Easter. However this ordinance may have originated, the letter of the law is carried out to the present day, as only one exception to it was found! While this state of affairs exists one can easily account for the dirty condition so noticeable on halls and stairs, as well as in some rooms where floors were old and irregular.

At Primary School No. 10, children poorly shod were found playing in melting snow, weeks after the snow had fallen. In this school there was an epidemic of whooping cough, and last year scarlet fever had been prevalent.

Why cannot school yards be cleaned as promptly as front pavements?

At one of the primary schools the visitor was much impressed with the filthy condition of the foreign element, which prodominated.

Can anything be suggested to enforce personal cleanliness?

There seems to be an unfortunate proximity in many cases of schools to saloons. One report mentions seven within two squares,

another six, still another five. Observation has shown the demoralizing effect, noticeable in bad language heard among children subjected to this evil, and it is hoped this may be remembered in the choice of new sites.

This committee makes no claim to new discoveries. The defects pointed out are known to the teachers, and have been noted (more emphatically perhaps) in school reports and by the public press.

Our report was offered to the School Board as an expression of opinion of women who, by actual observation, had found existing conditions worse than they had supposed; conditions many of which they believe might be promptly remedied.

Overcrowding *can* be relieved, more care *can* be exercised in renting annex buildings, cleanliness *can* be secured by fixing responsibility, the outhouses *can* be subjected to supervision and inspection and put in better condition.

Heating and ventilation can be better provided for in the old buildings, and rooms with insufficient light can be abandoned.

Conscientious teachers cannot do their best work in bad air and under depressing surroundings, and children should not be held responsible for stupidity and restlessness when subjected to those bad physical conditions to which they are specially sensitive.

SCHOOL LIFE AND CHILDREN'S EYESIGHT.

By Hiram Woods, M. D., Baltimore.

In presenting to the Public Health Association the influence of school-life upon children's eyesight, one must exclude all phases of the question, save those which are, to use a popular but not very definite term, practical.

The object of all health legislation is to prevent harm to the community. School authorities should do many things to prevent injury to children's eyes through the carelessness, ignorance or vice of others: but behind this is a principle no less important, more difficult of application, and not so generally recognized. It is, to prevent an individual from harming himself; the discovery of physical conditions causing no symptoms pointing distinctly to the organ at fault, but which, if undiscovered, may lead to serious trouble. Hygiene of the eye depends, I take it, upon early recognition of congenital malformation or disease changes, and upon environment during school life.

The eye holds an almost unique position in regard to the diseases of remote parts, and to the symptoms of some of its own affections. Not infrequently, without disease or alteration in structure, it becomes painful or ceases, to a greater or less degree,

to function. A familiar example is the so-called "blinding" or "sick" headache, pain in the head, accompanied at some stage by more or less impairment of vision. The eye is not diseased, but shows the effect of remote disturbance. Again, physicians who see much of the diseases of the nervous system recognize the importance of eye symptoms. They are often the first indicators of trouble in the central nervous system, and antedate other symptoms sometimes by years. In like manner the eye, though malformed or impaired by former disease, may show no readily recognized signs of trouble. Sight may be perfect, and yet headache, neuralgia and spasmodic muscular phenomena may occur, due to eye disease. So generally is the eye now recognized as a cause of headache, that many of the spectacle vendors in large cities advertise themselves as curers of headache. Often they do cure it. Frequently, as the case book of an oculist will show, they make matters worse by relying upon the only symptom which they are able to observe—acuteness of vision. In spite of all that has been done, whether from motives philanthropic, scientific or mercantile, there yet remains a great deal of ignorance on this subject.

Besides those born defective, there is another class of children whose sight has been injured by previous and perhaps forgotten disease. The defect may amount to impairment of vision so slight that parents and child may be unaware of it. In many cases there is no external evidence of disease, and in others it is discovered only by special examination. The child has no standard to which he can compare his visual acuity, and does not know what good or normal vision is. Use of such eyes often leads to serious results.

There are, then, two things to recognize at the beginning of school life: A child's eyes may be so structurally defective as to make study unsafe, and yet the function of the eye may not be materially involved, that is, sight may not be apparently defective. Eye disease in infancy may have left incurable defects, not gross enough to be detected (except by careful and trained examination) nor greatly destructive of vision. Yet this defect precludes the safe prosecution of work arranged for healthy eyes. Normal vision is pre-assumed by those who lay out the work of all schools except the School for the Blind. To insure against damage to children's eyes during school life it is necessary to ascertain their condition either before or as soon as possible after the entrance of the little ones upon school duties. Pain and remote disturbances will protect the children of intelligent parents, and such meetings as this will do much in the same direction, but it is in the public schools of the State and city that much work remains to be done.

What sort of work? It cannot, I think, be successfully contended that the school boards should employ oculists to examine

the eyes of all public school children, but they can and should provide means whereby early in school life inquiry may be made along the lines indicated, comparing each child's vision with the normal standard, and leading to the discovery of symptoms of eye malformation. Record should be made yearly, and any deterioration should be reported to parents.

In this connection a short account of the work done in the public schools of Baltimore under the guidance of my friend, Dr. Herbert Harlan, and myself, seems pertinent. I say "under the guidance," because the real credit and the valuable results are due to the public school teachers, who conducted the examination without extra compensation. Their work, so far as we have been able to review it, has been well done, and we take this opportunity to thank them for it. The following is an abstract from my report to the Medical and Chirurgical Faculty of Maryland at Ocean City in September, and published in the Maryland Medical Journal of October 3d, 1897:

"In the fall of 1895, at the request of the Committee on Health of the School Board of Baltimore City, a plan was submitted to the committee and adopted, for the examination of the eyes of the public school children. It was prepared by Dr. Herbert Harlan and the writer. In addition to preparing such a plan we were asked to inspect school buildings, note errors in construction, furnishing, etc., and report the same. Examination of the eyes was conducted as follows: Teachers were made examiners. Test cards were prepared containing letters to be read at distances from 200 to 20 feet, and smaller cards with fine print for determining the reading distance. Dr. Harlan and the writer met the principals of the schools and explained the method of obtaining visual acuity by these cards. Principals, in turn, instructed teachers, and the latter conducted examinations. The accuracy with which they did this new work, and their patience in it, are worthy of commendation.

"Our object was to discover, as soon after entrance as possible, the visual acuity of the children. An arbitrary standard of $\frac{20}{30}$ vision in the better eye was taken as the minimum for safe study. Children who did not come up to this were given a note stating to parents that the child's sight was below the standard, and advising that an oculist be consulted. A return certificate was attached, for the examiner, that the eyes had been inspected and were, or were not, considered strong enough to do school work. Blanks were also prepared for recording vision, these blanks to follow the child from grade to grade through school life.

"A year's experience has modified this plan in two particulars: 1. The first primary grade is omitted, as it was next to impossible to properly test the sight of such little children. 2. The return

certificate has been dropped. The board, as we understood it, did not feel justified in refusing a child admission to school because the certificate was negative, and hence the latter was a useless formality."

The record, which follows the child from grade to grade, and the letter to parents, are given below:

PUBLIC SCHOOLS OF BALTIMORE.

—— School No.—— Baltimore, —— 189 .

To M———. By examination, the sight of —— your son, daughter, or ward, is found below the standard necessary for safe performance of school work. You are advised to have the eyes examined by a physician who makes a specialty of eye diseases. Your family physician can advise you whom to cousult.

Respectfully,

————————

Principal.

PUBLIC SCHOOLS OF BALTIMORE.

—— School No.——. Name of scholar, ——; age, —— years; sex, ——; color, ——. Does he (or she) wear glasses? ——

		Grade. 2	3	4	5	6	7	8
Distant vision without glasses	right eye,							
	left "							
Distant vision with glasses worn....................	right "							
	left "							
Nearest point to face at which fine print is read..........	right "							
	left "							
Farthest point from face at which fine print is read....	right "							
	left "							

Are there complaints of head or eye pains produced by studying? ——

Signature of teacher making the examination:

Grade.		*Grade.*	
2	....	6	....
3	....	7	....
4	....	8	....
5	....		....

In the session of 1895-6, 53,069 children were examined. Forty-three per cent. had normal vision in each eye, while 17 per cent. fell below the prescribed standard. In the last session there were examined 39,241 children. Sixteen per cent. fell below the standard, while 52½ had normal vision in each eye. It is to be observed that the plan discovers only children with defective sight. Between these and those with normal vision in both eyes, there were left, the first year 40, and last year 31½ per cent. of all examined. Many of these were discovered through complaints of pain in studying, and through the observation of teachers, who became quick to detect evidence of defective eyes, when their attention had been once directed to the matter. Some cases, doubtless, escaped recognition. They will be discovered when vision has become impaired, either functionally or through organic injury to the eyes. An objective examination by one qualified to make it, is the only way of reaching these cases. The point to which special attention is directed, however, is the ease with which one-third of the children with defective eyes were discovered and put in the way of relief. This is the important part of eye-hygiene in connection with school life. Dr. Risley, of Philadelphia, in his article in "Norris and Oliver's System," demonstrates that faultless school equipments will not protect a badly shaped eye from damage by continued close work if the refraction error remains uncorrected. Hence, any plan must embrace an early examination of visual acuity, if nothing more.

It may be asked: What is the nature of the damage done to the eye in school life, and why does it occur at this period? Complete answer would carry me beyond the proper scope of this paper. Briefly, damage is in the direction of producing nearsightedness, and produced nearsightedness is a diseased condition. It is a constant source of danger, and not infrequently, after it has ceased to advance, the eye remains weakened, and liable to destructive disease. Elongation of the eyeball is the change leading to nearsightedness. The outer coat does not obtain its full power of resistance until about the twelfth year, or even later. Near work increases pressure within and upon the sides of the eye-globe, and certain refraction errors, notably astigmatism, demand increase of this pressure to give the child its best vision. Thus the danger of elongation is increased, and hence the importance of early examination.

Concerning the condition of school buildings, their situation, ventilation, lighting, furnishing, etc., so much has been written, that I shall speak only of three matters which have impressed me, both in daily work and in our recent examination of the schools.

A modified curriculum is needed for such children as have impaired sight, but who see too well to bar them from obtaining an

education. Most of them suffer from the negligence or ignorance of those in charge during the first few days of life. Again, the effects of poor food, life under wretched hygienic conditions, inherited disease, etc., not infrequently cause incurable eye defects. These children are not able to go on with the usual course. Our statistics show that they gradually drop out. What becomes of them? Many of them live in poverty, and grow up in ignorance. A question of more than ordinary importance is suggested by this class, which is not small in number. The records of any large eye hospital will furnish a small army of such children from one class of diseases:—those of the cornea. Congenital lens clouding—not operable—and myopia, with diminished acuity of vision, add many more. Subjects of every day use should be taught these children. They should have books with large, clear type. At present, unless they belong to the well-to do class, there is nothing open to them between the public school course and growing up in ignorance.

I touch on a second matter with misgivings; for it can be justly said that those in charge know more about it than I do, and there is room for difference of opinion. I allude to the amount of work often demanded of children, specially in the higher classes of our grammar and high schools. There are laws of growth and health applicable to mind and body which cannot be violated with impunity. A large number of studies differing widely in character are given at the same time, and unless lessons are long the courses cannot be finished. Is it always possible for a child to study all the lessons assigned, have three or even two hours for recreation, obtain eight hours' sleep and be up early enough to get through breakfast comfortably and reach school at 9 o'clock? Is not the "drive," as it is called, so characteristic of American life, given too much play in our schools? In one of the State schools I have met several girls who were being injured in this way, and not long since one of them consulted me to see if a clearly threatened breakdown was due to her eyes. I asked her for her daily routine; and here it is, just as she gave it: "Get up at half-past six and study before breakfast, reach school at a quarter of nine." Commencing as soon as she reached school, there was "physical culture" for half an hour, then what she called "opening exercises" for another thirty minutes. In immediate succession, without intermission, for forty minutes each day, physical geography, language or literature, and geometry; then, still without intermission, she went on alternate days to study the Constitution of the United States, or elocution, or voice training, for another forty minutes. After this period there was a recess of half an hour, which the pupil was "allowed to spend in the main hall, cloak-room or study-room." She was not allowed to go out of doors. After

recess there was botany for forty minutes daily, and twice a week the same time was given to music, drawing and sewing. No time was allowed for study; all this had to be done at home, and she added that she usually found it necessary to spend recess in copying notes—that the drawing, not done in the hour at school, had to be done at home on Saturday and Sunday. After school, until half-past three or four, she "looked up supplementary notes on botany and geometry." As a rule, she left for home at half-past four, and was at work after dinner by half-past seven. Occasionally she retired as early as eleven, but more frequently it was nearly one. This girl is not stupid, she is simply loaded down mentally and physically, and the very means used for preparing her for her life's work are sowing the seeds of future infirmities.

A third need is reform in the seating of children; certainly in our public and, I believe, to no less extent in the private schools of Baltimore. There are three points of importance to consider: First, the height of seat from floor; second, the distance of desk from seat; and third, height of desk. The following quotation from Dr. Risley's article expresses clearly the means by which these relations can be correctly maintained: "The arrangement of seat and desk must be such that the child will find it easier to sit upright at his work than in any other position he can assume in the seat. To secure this the seat must be of such a height as to permit the soles of the feet to rest upon the floor. The measured distance will be the same as that from the sole to the inner bend of the knee. The seat must be as wide as the thigh is long, measured from the inner bend of the knee to the back, and should be slightly concave to prevent sliding forward, but should not be inclined either backward or forward, *i. e.*, it should be level. The front edge of the seat should be placed from one to two and a half inches under the inner edge of the desk. This is known as the minus distance."

This latter term applies to the horizontal distance between the front edge of the seat and the rear edge of the desk. Seat and desk may have three possible relations. The seat may extend under the desk—minus distance—the front edge of the seat may be in the same vertical line, with the rear edge of the desk—nil distance—or there may be space between the seat and edge of desk—plus distance. Nor is it a matter of indifference or convenience which of these relations is obtained. The "plus" distance is to be avoided. Dr. Risley thus describes its dangers: "To work at a desk so placed, the pupil is compelled to reach forward. To do this, he perches himself on the front of the seat, while the feet are carried backward under it. The trunk falls forward and finds support upon the elbows, one or both of which rest upon the desk. If but one—

the left—is used for support, while the right is employed, as in writing, the vertebral column is partially turned on its long axis and the entire trunk held in a distorted position, which we may well believe is conducive to the production of spinal curvature in growing children. In this forward pose of the trunk the head is no longer supported by the spine, and must, therefore, be upheld by the muscles of the neck, which should be required only to balance the head. They soon tire, and the work then falls upon the muscles of the back, which in turn give up the task, and the head falls forward toward the work, while the trunk sags forward and downward between the shoulders, which are upheld by the arms, the elbows being supported by the desk. The face is brought too near the page, and the left eye nearer than the right. The normal relation between the plane of the face and the work is thus disturbed, which, together with the abnormal near point, adds greatly to the strain upon accommodation and convergence." Of no less importance than avoidance of this plus distance of the seat is the height of the desk. If too high, there is the same abnormal nearness of the face to the work, with consequent strain on accommodation and convergence; on the former, to enable the child to see the print; the latter, to keep the eyes fixed upon the work. At the same time, the arm in writing is thrown too high, with consequent distortion of the back and unnatural position of the body. Both of these effects of badly constructed desks are illustrated in Figures I and II, taken, by permission, from Dr. Risley's article in Norris and Oliver's "System of Diseases of the Eye," published by The J. B. Lippincott Company of Philadelphia. The position taken in the article is that of other careful observers. Dr. Hartwell, formerly of this city and now of Boston, may be cited as one, while in Cohn's "Hygiene of the Eye and Schools," and in other works, the same teaching is found.

There is of course recognition of the fact that small and large children cannot be comfortably accommodated in the same desk. In our public schools there are three sizes used. Their seat and desk measurements from the floor are:

HEIGHT OF SEAT FROM FLOOR.	HEIGHT OF DESK FROM FLOOR.
No. 1.... ......17.50 inches.	28.75 inches.
No. 2...........15.25 "	25.00 "
No. 3......... .13.50 "	22.00 "

These desks are arranged upon average measurements taken from a number of children of about the same age and in the same grade. That children of nearly the same age differ in height, is a matter of common observation. Last winter, in preparing a communication to the School Board upon the need of reform in seating children in the schools, I obtained from Dr.

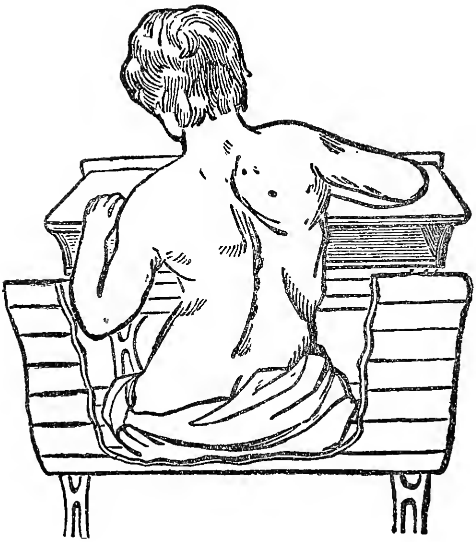


Fig. I.

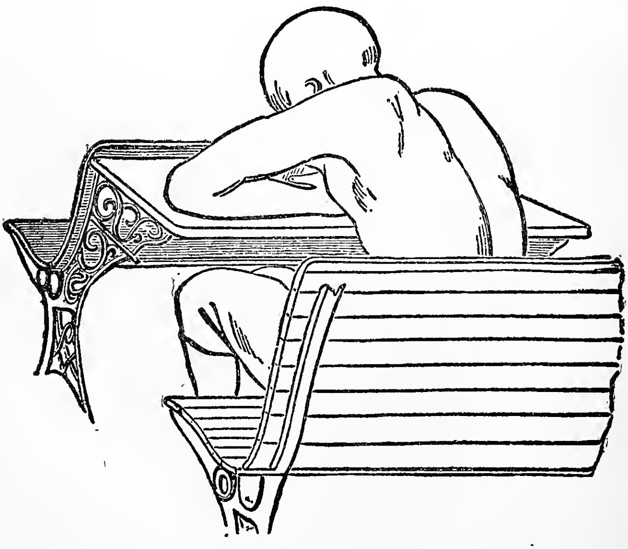


Fig. II.

Mary Sherword some figures from her measurements of the girls at Bryn Mawr School. The impossibility of fitting with accuracy many sizes of children in three sizes of desks was what I hoped to demonstrate. Comparing the school desks with the Bryn Mawr measurements, I said:

"Dr. Sherwood's measurements form a convenient and reliable standard by which to study the desks now in the public schools. No. 1 has seat height $17\frac{1}{2}$ inches, desk $28\frac{3}{4}$. A very small number of Dr. Sherwood's measurements show a knee height of over 17 inches. Again, the highest desk required by these children needing a seat as high as 17 inches, was 27.7 inches, the lowest $25\frac{1}{2}$. If these children had been given seats of the proper height, the desk would have been one inch too high for the nearest fit, and $3\frac{1}{4}$ inches too high for the farthest. Too great height of desk is a common fault. The book is brought too near the eyes, with corresponding increase in eye work.

"No. 2 desks have seat $15\frac{1}{4}$, desk 25 inches. Here is a difference from No. 1 in seat height of $2\frac{1}{4}$ inches. Dr. Sherwood's figures show a large number of children with knee height between $15\frac{3}{4}$ and 17 inches. Seats in No. 1 are too high, seats in No. 2 are too low for these children.

"Of 29 children with knee measurements of from 15 to 17 inches, 14 needed desks of a height from 25 to 27 inches, 15 from 22 to 25. Here is a difference of 2 inches in seat, and 5 in desk requirements. The ages of these girls were from 10 to 17. A study of figures giving knee measurements between $13\frac{1}{2}$ and 15 inches with the desk height needed, show the same irregularities.

"It may be urged that interchange of seats and desks in the three sizes will correct these discrepancies. It must be remembered that the part of the desk holding the books, papers, etc., will greatly interfere with such exchange."

A desk which can be made to fit the child seems then a necessity, if the laws of health are to be observed. Strain on accommodation and convergence means increased ocular pressure and constant nerve irritation; hence it is not hard to see that errors of refraction, not apt to cause trouble under healthy conditions, may become manifest and annoying under such as have been described, and that the good effects of most careful correction of such errors may be lessened. To arrange it so that "the child will find it easier to sit upright" than to assume any other position is not only a scientific theory; it is a duty upon which too much insistence cannot be laid. There are several "adjustable desks," the principle of all being that both seat and desk can be adjusted to any required height, and kept so. Figures III and IV, "both of which are taken from Dr. Risley's article," show the method of measuring the seat height, and of adjusting the

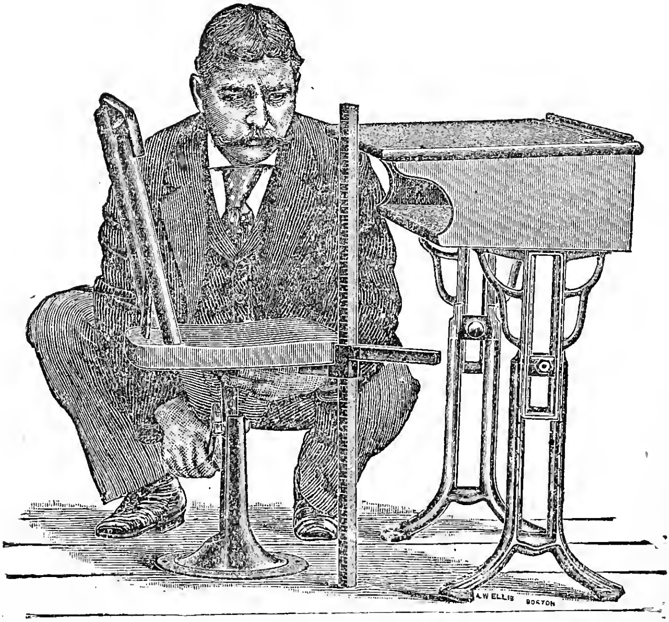


Fig. III.

seat. The desk in the former is the "Chandler" desk. It is used in the Bryn Mawr School in this city. The desk height is gotten practically by measuring from seat to elbow, and adding three-fourths of an inch. The object is to insure a distance of 13 or 14 inches from the top of desk to face, the child sitting in the upright position. In most respects the Chandler desk is satisfactory. Dr. Sherwood, who has had large experience at Bryn Mawr School, and has given careful stndy to the whole subject, had found one practical difficulty, which sometimes prevents the Chandler desk being "adjustable." In the case of children with either excessive knee height, or unusually short distance between the knee and elbow, either the seat is so high, or the desk so low, that there is not room for the child's thighs. Dr. Sherwood has kindly given me her Bryn Mawr measurements which illustrate this. The depth of the desk was six and one-half inches. After adjusting the seat and desk to measurements taken there were among eleven children, a maximum space for the thighs, 3.15 inches, and a minimum of 1.25 inches. If the seat is to be placed at the minus distance, as already insisted upon, the thighs must come under the desk. Thus, some children would be snugly and comfortably fitted, while to others, it would be impossible to adjust the desk at all. Dr. Sherwood's measurements bring out this phase of the subject quite clearly. She sends this table:

FIGURE IV.

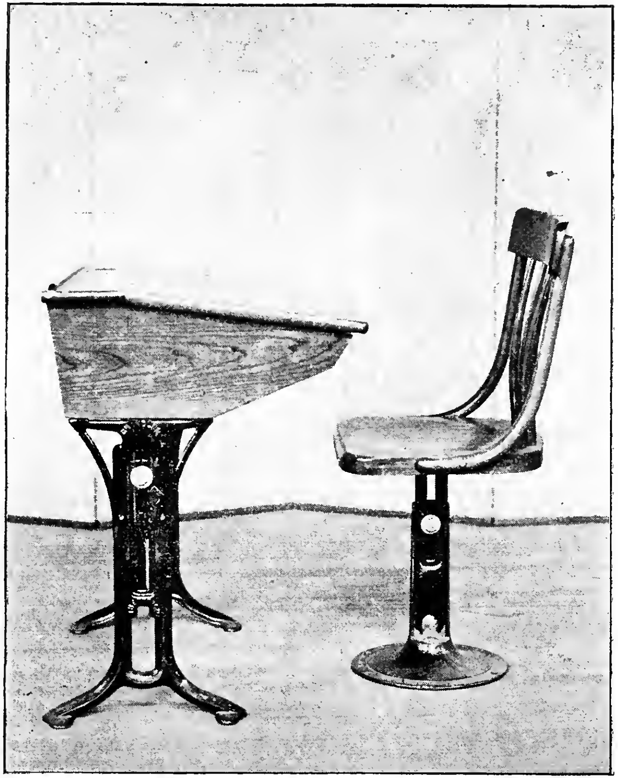


FIGURE V.

FIGURE VI.

	Height of Seat From Floor.	Desk From Floor.	Desk From Seat.	Space Left for Thighs With Desk Top 6½ Inches Deep.
Child 1	..14.2 inches	21.95 inches.	7.75 inches.	1.25 inches.
2	14.8	23.15	8.35	1.85
3	15.4	24.05	8.65	2.15
4	14.2	22.45	8.25	1.75
5	15.3	24.05	8.75	2.25
6	14.	22.85	8.85	2.35
7	14.7	22.95	8.25	1.75
8	15.3	24.55	9.25	2.75
9	15.	23.95	8.95	2.45
10	14.9	22.65	7.75	1.25
11	14.4	24.05	9.65	3.15

Dr. Sherwood adds to her table: "The last column is found by subtracting six-and-a-half inches, the depth of box, from space between seat and top of desk, and demonstrates the impossibility of properly adjusting the old desk in many cases." To meet this defect in the old adjustable desk, Dr. Sherwood has devised an interesting and ingenious modification, illustrations of which are appended. The adjustable attachments are the same as those of the Chandler desk, the Chandlers being the makers of Dr. Sherwood's patent. As is seen in the illustrations, the modification consists essentially in "the end panels being formed at their front edges with bevels or inclines," a similarly "beveled or inclined panel portion extending across the front portion of the desk-body below the front edge of the inclined top." The interior of the desk, which for the purposes of this paper it is unnecessary to illustrate, affords ample room for books, pens, paper, etc. The desk seems to me to meet the difficulty for which it was devised. The slope of the top is five degrees from the horizontal.

In conclusion I want to thank Dr. Risley and the J. B. Lippincott Co. for permission to use plates in Norris and Oliver's System of Diseases of the Eye, and my friend Dr. Sherwood for the facilities she has given for me studying the question of seating school children.

DISCUSSION.

Dr. Welch: These papers are now open for public discussion. I hope that it will be a very general one, and, especially, that the ladies will participate, for, as I said a minute ago, and possibly it will bear repetition, the foremost purpose of this Association is to educate the general public, including the physicians, in matters relating to personal and public hygiene, and experience shows that we need the co operation of the ladies in order

to secure the very best results. It is our desire and aim to interest them, and we are very anxious that they should not only become members, but take a part in the proceedings of the Maryland Public Health Association. It is intended for the benefit of the whole community, and, unless we secure a widespread general interest, we shall not think we have succeeded.

Col. Rogers, of Towson: I would like to make a proposition that this body appoint a committee to draw up and have printed, so that it can be distributed in all the schools of the State, a pamphlet clearly setting forth the early symptoms in contagious diseases. I think this would be a great advantage. It is unreasonable to expect the teachers to know the symptoms of these diseases without their having some authoritative source from which to derive reliable information.

Mrs. Fendler, New York: In New York we have 150 public schools, and for each one there has been appointed by the Board of Health a medical inspector. The teachers are instructed how to distinguish the sick from the healthy children, and when they find one who seems sick they take him to the physician who visits the school from 9 to 10 daily. If he finds the child sick he sends it home at once. Of course you have no tenement houses such as ours. When one of the children in a tenement house is sick of an infectious disease the physician attending that child has to report it to the Board of Health, who send the information to the principal of the school in that district. The principal must then send home every child from that house, whether from the same family or not. The children from that house cannot attend school again until they can bring a clean bill of health from the doctor.

As to saloons, we have a law in New York that within 100 feet of a school there can exist no saloon.

Prof. E. B. Prettyman, of Baltimore: It is a pleasure to me on behalf of the schools of the State of Maryland, with which I have an official relation, to acknowledge the great debt of gratitude that we are under to the medical profession for advancing the work in which we are engaged. My official connections are with the schools outside of the city of Baltimore, and from a general knowledge of the schools and their officers throughout the State I am personally aware that they are in thorough sympathy with every effort made for the advancement of the schools. The teachers are deeply interested in everything concerning the advancement of the schools. They study their journals and notice very carefully the extracts from the medical papers. There are many of them here to-day to listen to what may be said by the members of your learned faculty. We are under a weight of gratitude for your co-operation in educational work. The

subjects of ventilation, eyesight, proper rooms, etc., are questions of frequent discussion among the teachers at their associations, and they are happy to avail themselves always of the extensive and accurate knowledge which your profession affords them. We are here to-day to learn what additional things can be said to enlighten the profession throughout the State, and we trust that the papers will give our people widespread access to the views here given.

I think it is right, however, that whilst we join with the medical profession in the agitation of these questions, it is proper that we should be careful in recognizing the things we may do. I find, sir, that outside of your profession there are no people in the State more eager to help the children in everything that will improve their healthfulness, give protection to their eyesight and assist them to grow up strong and healthy, than those people who are connected with the public schools of the State. It was a delight to me to hear from the distinguished gentlemen who discussed the subject of eyesight, that the teachers of the State had so quickly seized the opportunity to give aid in this matter, when the medical fraternity came forward and instructed them how. They are always ready to assist you.

The school officers, I think, have done all they could do to provide proper ventilation, light, heating, etc., but the difficulty (and let us recognize it that we may carry our agitation to the proper place) is not with the school officials. In my reading I noticed a few days ago that in a certain county in Georgia, the school commissioners having charge of all the public schools in that county were given by law the unrestrained right of taxation for the purpose of sustaining the public schools. I have no question, sir, that there would have been many more reforms in the State looking to the healthfulness of the children, but for the want of money in the hands of the school boards. I know that any one who will take the trouble to glance over the reports will see that few of the schools in the State have sufficient money to carry on their work. The teachers must be paid, new houses must be built, and you will see that the amount of money is very limited. From my personal intercourse with these officers, I know that they would do many things that they cannot do for lack of money. Now I hold this to be true, too, that the officers throughout the State who have charge of the taxation, will always obey public opinion. It is right that they should be careful about the expenditure of money; they are placed in office for that purpose; but whenever the general public takes the position that they desire more money for any purpose, these officers will levy it. When that has been done, it will be in the power of the school officers to carry out the various reforms that have been suggested. Then I say, let us in the city and throughout the

State do our part to create a public opinion which will express itself in a demand that these various reforms be carried out. Let us demonstrate to the people who levy the taxes that they must levy more taxes for the use of the school officers, for without this they are totally helpless. Let us, working together, your profession and ours, try to create a public opinion that will demand these reforms. There are members of the school boards here who can speak for themselves.

Dr. Welch: Prof. Prettyman has touched the kernel of the matter; that the public must be educated on the subject. That is the purpose of our coming here; to emphasize these defects, and to educate the public up to the necessity for reform.

Mr. John T. Morris, of Baltimore: The subject matter of the papers read this afternoon is of great interest. It is of interest to every person engaged in the subject of public education, and I feel quite sure that a large number of the persons here belong to that class. I came for the purpose of hearing what was said in the papers, not that I was not aware before of the existence of these evils, but I was anxious to learn what those not officially connected with the schools had seen and learned. I regret very much to confess that most of the statements made in those papers are true and correct, and that the criticisms made upon the schools are unfortunately just. I wish it were otherwise. Those who have been connected with the schools for some years, can explain to you the cause of this. Sometimes I fear that the public at large, when they learn of these troubles, visit them entirely upon those in control of the public schools, because a large majority of the persons in the community believe that the schools are entirely in control of the commissioners, and that they have the power to call for whatever money is necessary to keep the schools in proper condition. Not so, Mr. Chairman; I beg to say that if this was the fact, you would have no cause to complain of any of the matters that have been so forcibly presented to you this afternoon. For years we have gone to those in authority, to beg for an appropriation for the amount of money necessary to erect proper school houses for the children in the community. We know that thirty or forty houses, occupied by 6,000 children in the city of Baltimore, are unsuitable, and many are unfit for use. Yet there is but one of two things to be done; either you must exclude entirely from education 6,000 children in this city, or educate them in such buildings as you can find for the purpose, until we obtain money for rebuilding. You understand the dilemma in which we are placed. Which is the better, to turn loose 6,000 children and say "you shall receive no education," or to educate them to the best of our ability in such

houses as are available? It has sometimes seemed that it might be better to throw the children upon the community, and in that way bring the question more forcibly to the public mind. Perhaps we may come to that yet, unless the necessary money is voted for the purpose of building.

Now we have in our board a number of physicians who watch over the health of the children as far as they can, and who have very recently made an inspection of all the buildings and made a report on the subject, and if it is possible to obtain of the city the necessary money, the board will most urgently work for these reforms. I desire to say that those in charge of your schools are not neglecting them. They are not responsible personally for their condition. They give you all the city allows. Now I invoke your aid generally, and I trust we shall all co-operate during the coming year in bringing a pressure upon the new administration for a more liberal appropriation. I am glad to hear from the new executive that he wants a more liberal appropriation, and I trust the same mind will also prevail in the Council. I pray that during the coming year we may be able to remove many of those evils of which explanation has been made this afternoon.

Mr. Nichols, of Easton: I think the commissioners of the counties throughout the State should interest themselves in the coming Legislature in having our taxes increased for maintaining the schools. I represent a county that has ninety-three teachers, and we receive $21,000. We asked that it be increased to $26,000, but the request was refused. Now I think that if every county in the State and the City of Baltimore would interest themselves to have the State taxes increased, this burden would be distributed more equally than it now is. Our County Commissioners cannot give us any more money. I am ashamed to say how little we pay our teachers, and we are losing our best teachers. We cut one-tenth of the salary by cutting off one-tenth of the teaching year, and some of our teachers are working for $270 a year. This is not the School Board's fault; we cannot help it. Last year we reduced the term to nine months, the first time we have ever had to do that in Talbot county. This year we had to reduce the salaries as well. A tax rate of ten and one-half cents is totally inadequate to run the schools.

I would like to ask Dr. Woods a question in regard to the eyes. We have had considerable complaint in regard to the children being compelled to study late at night. I want to ask whether writing on the white tablets has not affected the childrens' eyesight. When I went to school, we used slates, but now they have been almost entirely abolished.

Col. Rogers: I want to say a few words on how impossible it is for a county to inaugurate all the improvements that have

been suggested here; for instance, in Baltimore county, the per capita cost for educating children is $12.80. Now if we put new desks in our schools at $5.00 a piece, it leaves but $7.80 to run our schools, and if you undertake the improved methods of ventilation and all the other things that have been suggested here you would get away with the rest of the money, and have nothing left to run the schools. You would have to close the schools for at least one year, and could not educate a child during that time, if you wished to introduce these things, and get ready for the next year.

There is another feature of the State law that does not work well. The law says the County Commissioners must appropriate money for two purposes; one for running expenses, and the other for building account. The first account cannot be touched for the second purpose, nor vice versa. So there you would meet with another obstacle; even the small amount of money appropriated is not available to be used for all purposes. Our friends of Howard county were hauled over the coals, but as a matter of fact they are not much to blame.

There is another question that comes up, and I am glad that the school and medical people have come together. If you want public sentiment educated on health matters, the information must come from the medical faculty; it cannot originate with the school authorities, because they are mostly laymen. Let physicians urge upon their people the necessity for these things. They will believe the physician, they won't believe the laymen. What do I know about it? I am only a layman, but if the physician of a community will ask for those things, we stand some chance of getting them. The coming together of these two bodies ought to produce an immense amount of good.

Dr. Edw. M. Schaeffer, of Baltimore: I had the pleasure a short time ago of being tendered a complimentary seat at one of these school desks. I sat down and saw that it was readily adjusted to my proportions, and I regard it as an advance on any desk I have yet seen. It is true that this desk will cost a little more than the others, but it will well repay the investors. I have taken an interest in public school matters for some time, and, notwithstanding the expression of opinion given here as to the promptness with which every suggestion was accepted, I think we cannot too strongly emphasize the great need in Baltimore for a complete revision of the sanitary condition of the schools. I visited the schools here about two years ago while considering the subject of physical training. I found many rooms where the ventilation is so bad that we might almost say the children are kept in "durance vile," and I think the parents could have redress through the law. I said once before here that lateral curvature might be said to be a school-board disease. I asked some

of the oldest girls in a school to stand up, and I found that girls 5 feet 5 were seated at primary school desks. When they attempted to rise it looked as if they were undergoing a process of disarticulation. I was told by a reliable person that, in one of the new schools, on the first day it was opened, quite a number of children had to be seated on the floor. There is no use mincing matters—these are vital questions of education, health and life.

I had the pleasure of seeing some of the schools in Howard county, and while some things are very much to be commended, the difficulty of expense seems to kill the whole question of sanitation.

I will only say, in conclusion, that I think the problem of reform in schools is one in which the present administration could be best signalized before the parents of the community. We are singularly backward in these questions, but now that the ladies are looking into the subject, I have no doubt that a quicker response will be manifest.

Dr. Thomas B. Owings, of Ellicott City: I have had some connection with the public schools of Howard county for some years, and while I am not an officer, and never have been, yet my position of health officer of the county, and a very close social relation with the commissioners of the county, has brought me often into the schools. It is all very well to talk about these improvements. Howard county has fifty-six schools. The commissioners give the school board $14,000, the State gives it $9,000, and then I think there is an additional fund of about $2,500 to carry on those schools, keep up the buildings, build new ones when necessary, and you see they have a very small margin for improvements. Dr. Fort has spoken of the condition of the schools of Howard county. He spoke of vaccination—thirteen schools that had no record of it. Why, doesn't Dr. Fort know that each and every teacher in Howard county is compelled to have a certificate of vaccination for every scholar attending school? Where are those thirteen schools? How can they exist unless those teachers are guilty of falsehood? Col. Rogers knows that he requires that a certificate shall be given for each and every scholar, and that the teacher is not allowed wages for any scholar who has not a certificate. Am I not correct?

Col. Rogers: Yes, sir.

Dr. Owings: A few days ago I was talking to a gentleman with reference to our school buildings in Howard county, and he said he thought they compared more than favorably with any other county in Maryland which he had visited. The main trouble is the want of money, and when you talk about taxing the people of our county to get a larger school fund, you had

better get out of the county, if you don't they'll soon have shot-guns after you. If you are a physician you had better keep your mouth shut, or you will soon find that you will have no patients. The Secretary of the State Board of Health kindly sent his inspector to the county, and had analyzed specimens of the water supply of every school. There were a number reported bad, but I have been acting with the Board of Commissioners since that time, and I do not think there are more than one or two cases where that evil has not been remedied, and almost every school in the county now has pure water. I do not know where Dr. Fort gets his views as to the uncleanly condition of the school-houses. Why, I would be ashamed to come up here and tell these ladies such things. I have too much regard for the fair sex for that. If you will take the trouble to go to Howard county you will find our school-houses in as good condition as the houses in any other county in the State, so far as I have been able to see. What we want is unity of action, not simply among the school boards and teachers, but of all persons interested in the education of our children, to go to the Legislature for more funds to carry on the schools. Do that, and you will improve the schools and improve the health of the little ones who are to take our places in a few years.

Mr. Hartshorne: It has been very interesting to hear this discussion, because it shows that something is going to be done. You can't expect any reform in a person's character until his faults have been pointed out to him. Until he knows there is some trouble, he feels satisfied with himself. I am glad these questions have come up, because we are beginning to learn where the troubles are, and that is one of the great points in this association's work—to disseminate a knowledge of these tronbles.

Here in Baltimore at least, it is acknowledged that the schools are in a bad condition. The Board seems to know it; it is very evident that what money they have will be spent hereafter in the best way to arrive at the desired conditions. Occasionally it is necessary to build new school houses, and they should certainly be built upon right principles. When the desks wear out, (I was a school boy myself, and I know that they have a habit of wearing out,) they should be replaced by improved desks. These things can be done without increased taxation. By working in the right way a great deal can be accomplished with a small amount of money.

Dr. Purnell, of Snow Hill: For the prevention of certain eye affections, and even thoracic diseases, I recommended sometime ago a desk with the top at a less obtuse angle in relation to the floor, i. e., a much greater slope upwards than those now in use in many of our schools. The scholars would not then bend

the body forward so much or so often, and would be less disposed to incline the head, with the eye downward, and too near the object. I recommended an angle of about thirty degrees, perhaps a smaller one would be better. The chief difficulty about designing a perfect desk, is that the slope which best suits the pupil for reading is most unsuitable for writing. For reading, a slope upward of forty-five degrees or more would be convenient, but writing could not be done on such a desk. Perhaps it is best not to seek a compromise between these two needs, but to adapt the desk to writing, and to trust that the pupil's accommodation will not be injured by the effort to read from a book so nearly horizontal.

Dr. Gilchrist, of Baltimore: In connection with this question I think it is right to call attention again to the prominence of contagious diseases of the skin in the public school children of Baltimore. I drew attention to this once before, particularly with reference to ring-worm. There are cases of this by the score in our schools and everyone is a source of contagion. Another common disease is Impetigo, occurring on the hands and face, and I think every child attending the school with a skin lesion should be excluded until a certificate is obtained showing that the condition is not contagious.

Dr. Taneyhill, of Baltimore: After hearing a great deal of criticism, possibly a few words of encouragement as to what is being done in the school houses of Baltimore might give a little more satisfaction than if this most intelligent audience were permitted to leave the room feeling that there is nothing but criticism for school boards. I beg leave to say a few words in regard to the advance which the members of the health committee of the School Board of Baltimore would like to make, and to rivet the attention of this audience on one point in particular, namely: that the money question is the great one to be solved in regard to making improvements, correcting errors, and placing the schools of Baltimore in sanitary condition. I am glad that I have been anticipated by our honored ex-president.

I desire to review some of the work that has been done, and I do so because I think it renders justice to two departments that deserve commendation, and this will come with perhaps more grace from myself, who happen not to be of the same politics as our health commissioner. I want to commend his work. I can speak through two of his inspectors who have reported on an investigation of the schools. I shall refer to them from a paper I hold in my hand. The other department which deserves praise for its work is that of the inspector of buildings. That man has done more under Mayor Hooper's administration than all the inspectors of buildings for the last twenty-seven years.

The committee on health of the Board of School Commissioners early in this calendar year began a systematic inspection of those schoolhouses which, by reason of their unsanitary condition, demanded prompt attention. Several communications were received by the committee from outside sources, as well as from members of the board, all of which received respectful attention, although some of the criticisms were not couched in the most elegant language; but it was discovered that many of the conditions referred to had already been inspected by the proper authorities, and the relief sought had been inaugurated.

Early in May, 1897, at the suggestion of a member of the committee, the board ordered a circular-letter to the "local committee" of each school, requesting definite information regarding each schoolhouse and its environments. In answer to that circular many reports were received. In making the rounds of the schools the committee found that the inspector of buildings, Mr. Owens, had in many cases, as far as his appropriation would warrant it, applied the necessary measures for the relief of the grievances. But in this effort to improve the sanitary condition of old and ill-constructed buildings it is much easier to criticize than to remedy evils. To take a dark and ill-ventilated old building and introduce modern sanitary improvements is a task that may puzzle the best informed sanitarian.

Many of these antiquated buildings are so ill-lighted that Drs. Harlan and Woods, the oculists appointed by the School Board to inspect the eyes of the children, were compelled to condemn many of the rooms as unsuitable places for study. Even the proper provision for the general health of pupils at this, the most important period of their young and growing brains and bodies, cannot in many of these buildings be made. The contracted space allotted for the yards was apparently only equaled by the contracted appropriations. The committee has found it impracticable to supply "enforced ventilation" in these buildings on account of their faulty construction. This system is the only system now advocated by those who are considered experts in this branch of science; it includes the use of fans, by which moderately warmed air is forced into the schoolroom in such quantities as to give to each pupil 1,800 cubic feet of air per hour to breathe. One member of the committee has seen this system work admirably in New York city. It is highly commended by School Commissioner Buckley, of that city. In Baltimore we have it in three or four buildings. The committee call the attention of the Public Health Association to that admirably-constructed building, with all modern conveniences, Annex School No. 3, at the corner of St. Paul and Twenty-sixth streets, where the fans are in use. While this board has not the money with which to adapt these modern appliances to their antiquated buildings, yet common-sense dictates that they should at least carry up

the ventilating shafts of the privies to such a height that only pure air may be admitted to the rooms. This is in process now, and "ventilating elbows" have been ordered placed at least on one side of the rooms. The so-called "Smead system" of heating and ventilating is used in a few of the schoolhouses. To the uninformed it may appear not only ingenious, but susceptible of satisfactory execution. It is not as simple as some of its advocates would have us believe, and the desired results could more probably be attained by placing experienced engineers in charge, instead of political appointees.

The negligence concerning the evacuation of the urinals in the past years is astounding to the committee. A few dollars judiciously and intelligently spent in each yard by running a conducting "flow-pipe" in each urinal, to be turned off by the janitress at the close of the school hours, would have obviated much of the disgusting and unhealthy odor from many of these necessary conveniences. A few balls of carbolated camphor in a wire screen at the exit of the urinals would assist materially in reducing the obnoxious effluvia. Orders have been given that the above suggestions be carried out.

In this crusade against filthiness and ill-ventilation in our school-houses, the Committee on Health availed itself of the reports made to the City Health Department by the inspectors, Drs. Ernest Tschudy and D. S. Williams. These officers have thus far inspected and reported upon nineteen of the thirty-eight primary school-houses, four of the grammar schools, three of the English-German, one of the annex, two of the colored schools. In these twenty-nine reports they give the location and a complete description of the buildings, the number of departments, the number of class-rooms, how heated, how ventilated, the location of the plumbing, whether or not "trapped," the condition of the cellars, the location of the privies and their proximity to the school-houses, the condition of the urinals, whether or not they have water supply, the condition of the yards, the drainage, the number of pupils in each room, and the air-space per capita available in each room. Guided by these reports, the Health Committee of the School Board followed up the defects, which, as far as possible, have been relieved. But here again insurmountable difficulties confronted the committee, such as finding that the annex to Primary No. 3, at 118 N. High street, is a dilapidated building, wholly unfit for the purposes used. A similar condition obtains at annex to No. 12 Primary, at 611 Barre street. No. 30 Primary, on Hollins street, between Fulton and Monroe, cannot be properly ventilated in its present condition. In many of the rooms, especially in the annex to No. 12 Primary, mentioned above, and in Primary No. 36, at 2223 E. Baltimore street, the air-space per capita was found to be below 100 cubic

feet, with fifty-three and at times sixty-four pupils in a room. This crowding, which the committee painfully acknowledges, prevented even partial ventilation. It does not take a sanitarian or inspector to observe that one of the crying evils of this city is the insufficient number of well-lighted, well-ventilated, healthy school-houses.

As far as the appropriation will warrant the inspector of buildings is following up the suggestions of the Committee on Health.

Since this new School Board came into power, the following sanitary improvements have been made by Mr. Owens:

No. 3 Primary and Grammar, flush pipe run into urinal trough.

No. 8 Grammar—Branch Ventilators placed on water closets.

No. 11 Grammar, urinal trough removed, and strainer put in.

No. 12 Grammar, glass partitions put in water closet to protect children.

No. 15 Grammar, flush pipe put in urinal trough.

No. 16 Grammar, urinal trough lengthened, and screen put up.

No. 21 Grammar, new flush closet system, complete, introduced.

Western Female High School, extending flush system from Crook Mansion to High School building.

No. 6 Primary, two sanitary closets introduced in place of old plan closet.

No. 11 Primary, water put in urinal troughs.

No. 16 Primary, new metal caps placed on water closets for ventilation.

No. 28 Primary, new iron urinal trough introduced.

No. 8 and No. 30 Primary, new flush closet system now being introduced.

No. 1 English-German, brick vent flues rebuilt and raised on water closet.

No. 3 English-German, flush pipe put in urinal trough, and new iron urinal trough put in branch of No. 3 English-German.

No. 7 Colored School, additional water supply put in.

No. 8 Branch Annex, water introduced in the school.

The above enumeration should convince any unprejudiced mind that the proper authorities have not been "indifferent" to the urgent necessity of improving the sanitary condition of our school houses, though publicly subjected to adverse criticism by parties who doubtless, if they shouldered the onerous task would find that it is much easier to point out many defects than to remedy the same.

Mr. Nichols: I beg to offer the following resolution:

Resolved, That the present tax of 10½ cents is inadequate to the support of the public schools of Maryland, and that the members of this association pledge their united and individual

influence to secure an increased appropriation by the coming Legislature for the use of public education.

Dr. Fulton moved that the resolution be referred to the Committee on Legislation, and it was so ordered.

Dr. Fort: I only wish to add a word in regard to vaccination. I suppose I ought to feel like a crushed strawberry, but I don't. I happen to have been from childhood quite "handy" with a shotgun, and, therefore, do not expect to move out of Howard county through fear of another man with a gun. I got my information in regard to vaccination from the schedules filled out by the teachers of Howard county, of whom thirteen, over their own signatures, stated that no vaccination was required. If it is required why did they make such a statement? So far as that goes, a physician will vaccinate a child and at once give a certificate to that effect, but the child not returning, he doesn't know whether the vaccination has taken or not. If it has not taken, the child is just as unprotected as if it had never been vaccinated at all. Possibly the law regulating vaccination needs some improvement to cover this fault. The certificate merely states that the child has been vaccinated. Whether it has been successfully done or not is an entirely different thing.

Dr. Woods: I regret that in discussion of the adjustment of desks, I did not state that the school board has taken up the matter for consideration. I hope they will pay particular attention to the work of Dr. Sherwood, which, I think, next to that of Dr. Risley, is the most important that has been done.

In answer to Dr. Nichol's question about the white paper, I should say there is but one way in which it might do harm. If the paper was strongly glazed, and the light fell upon it in such a way that the light was flashed back into the eye, it might produce trouble. Some of our school rooms are separated from each other by glass partitions, and those partitions are the main source of light in the room. If the child has to face that partition, the reflection of light on the glazed paper might cause trouble.

Mr. Benjamin Owens, of Baltimore: I have nothing to say save this, that so far as the public school buildings of Baltimore are concerned, I know that we are making improvements. This can readily be seen by visiting some of the older buildings, and comparing them with some of those more recently opened.

Dr. Welch: While the subject has not been exhausted it hardly seems practicable to prolong the discussion any further at this time. Permit me to say, however, just one word. This discussion has been most instructive, and is calculated to do a great deal of good. Certain defects are admitted to exist, and it is

gratifying to hear Dr. Taneyhill say that they are being remedied. Some of them require no money, some do. I would like to emphasize three suggestions as to the improvements. One is, that the mere calling attention to certain defects should in itself alone suffice to remedy them, for that is in the line of educating the public sentiment. The second is, the need of a larger fund for carrying on this work. It is perfectly evident that the money spent for the education of children is capital invested at a very large rate of interest. Thirdly, many of these defects, I think, can be remedied best by medical inspection of the schools. That point has not been emphasized as much as I should like to have seen it, and there is not time now. These three points strike me as worth having been brought out prominently, and they are calculated to do much good. They will be no experiments, for we all know how much has been accomplished elsewhere.

Col. Rogers: I would like to add to my resolution the request that that pamphlet should also contain the existing law in regard to vaccination and any other matters of public health, and also a statement of the best methods of ventilating school buildings in the county. I think this would add to the value of the pamphlet.

Dr. Fulton moved that this resolution be referred to the executive committee, and it was so ordered.

Dr. Welch: I wish to express the thanks of the Association to those who have come here to assist in this discussion, and to say that we are greatly indebted to them for having contributed so much to the success of this meeting.

Mr. Nichols: Before you adjourn I want to extend an invitation to this Association to hold its next meeting at Easton, Md. I can assure you that a cordial welcome will be extended.

Levering Hall, Johns Hopkins University,

Friday Evening Session.

The meeting was called to order by Dr. C. M. Ellis, President of the Medical and Chirurgical Faculty of Maryland, at 8.15 P. M.

It is eminently fitting that any great scheme devised for the betterment of public health, should be critically discussed by that class of citizens, whose education and training qualify them to pass authoritative judgment thereupon. This session is convened for the purpose of considering the report of the Sewerage Commission, submitted to the Mayor and City Council of Baltimore. It is the right of the people to know what those who are

expert in the science of preventive medicine think of such work, and whether they approve or disapprove plans for public works, which not only involve the expenditure of large sums of money, but which are to become permanent structures, which must supply the requirements of a growing city for many years to come, and upon the operation of which depends the future health and happiness of this fair city and its people. This inquiry is not to be a captious one, but we are here to compare the plans with well considered deliberation, to seriously give our best thoughts to the plans suggested, in order to make sure that our approval shall be given to that which is best guaranteed to produce the results desired. Having done this, our next duty is plain. It is to educate the people in this spirit, and to sustain those in whose hands the measure lies to secure the necessary legislation. What a happy state Maryland would be if her General Assembly, soon to convene, and with whom the ultimate fate of the measures will rest, should find among its members gentlemen of the same capacity as the distinguished men who are here convened to-night.

ABSTRACT OF THE REPORT OF THE SEWERAGE COMMISSION.

By Dr. James F. McShane, *Health Commissioner of Baltimore.*

The report opens with a record of the joint resolutions creating and continuing the commission. It records the general features of the city with reference to sewerage, the population, water supply, climatic conditions, rainfall, storm-water drainage, cesspools and the disposal of night soil. It describes the several methods of disposing of sewage, and gives some account of the more noted examples of these methods. It then refers to the investigations of its consulting engineers, Messrs. Samuel M. Gray and Rudolph Hering, whose joint report accompanies the report of the commission as an appendix thereto, and compares the cost of the several projects considered by them. This is followed by a discussion of the relative availability of the several projects for use by the city. The oyster interests are considered, and the possibility of injury to any of these beds discussed. This is followed by the record of an investigation into the currents of the Chesapeake Bay off North Point, in which the commission was aided by the advice of General Craighill, U. S. A., retired, whose report thereon is found in an appendix. A tabulated comparison of the cost of the method finally recommended by the commission, (discharge into the Chesapeake Bay,) with the only other method which is deemed desirable and suitable (filtration upon land in Anne Arundel county) is then made. The effects of a discharge of the sewage into the waters of the

bay is also discussed. This is followed by a comparison of the methods of disposal considered and recommended for Baltimore with methods in use elsewhere, and is illustrated by graphic diagrams.

Then follow the conclusions and recommendations of the commission, which are given herewith in full.

The Sewerage Commission having carefully considered the whole subject, having duly weighed the recommendations of its expert advisers, and at the same time kept in mind its duty to the tax-payers of the City of Baltimore, now presents to the Mayor and City Council, and through them to its fellow-citizens, its conclusions and recommendations. It deems it of paramount necessity that storm water and domestic sewage should be collected separately and separately disposed of. That subsoil drainage should also, as far as possible, be separated and disposed of with the storm water. That the storm water should pass by way of the existing storm-water drains and natural water-courses to the river and harbor as now. From these and their future extensions should be excluded, as soon as the development of the system now recommended makes this possible, all domestic sewage and foul matter except street washings.

That the domestic sewage should be collected by a system of high level and low level intercepting sewers on lines substantially as laid down on the plans and profiles shown on Plates III and A, and disposed of by a continuous discharge into Chesapeake Bay at a point approximately located at K on the chart, Plate II, being some two and a-half miles about due east of the Rear Range Light of the Craighill Channel. The high level intercepting sewer serving about three-fourths of the forecast population of the city, will reach this point by gravity. The low level intercepting sewer will collect at a point on the left or east bank of Jones Falls opposite Water street all the drainage from the outlying low grounds of Fells Point, Old Town, Locust Point, Ferry Point, and such portions of the more central portion of the city as lie below the level of the gravity flow, and from a single pumping station there located will lift and force the low level sewage, about one-fourth of the whole, into the gravity sewer, at a point near the intersection of Broadway and Lombard street, whence all will flow together by gravity to the outfall in the bay.

The reasons which controlled the commission in arriving at the conclusion that this method of disposal is the best for the city of Baltimore, are discussed in detail, briefly summarized.

There are three possible methods of disposal:

1. By dilution into the waters of the bay.

2. By chemical precipitation of the solids and disposal of the effluent into the river or bay.

3. By filtration upon lands in Anne Arundel county.

The second is eliminated as offering no advantages when either the first or third can be made to serve efficiently the desired end, unless as a temporary expedient in connection with the ultimate adoption of the third.

The third method, being the one recommended by Messrs. Gray and Hering, is both theoretically and practically the best method of disposal. It returns to the earth the organic matter originally derived from it, and leaves the watery portion of the sewage remaining after irrigation of the soil and crops to pass off in a state bordering closely on purity.

Better soil for use with this method than that of Anne Arundel county is rarely found, and there could be no hesitation in accepting it as the method best adapted to our needs were it not that its first cost at completion is not only more than double that of the first method, but the annual cost of working it is about three times as much as the other. This consideration of excessive cost has had much weight with the commission, and whilst it could not have led it to recommend an inefficient project under any circumstances, it has induced a particularly careful examination of all the arguments likely to be presented against the method now recommended. These inquiries and investigations have satisfied your commission that the adoption of the system by which the sewage will be discharged into the bay will cause no injury, present or prospective, either to the people who dwell along the shores of the bay or to the important commercial interests in which Baltimore itself has so large a stake; and the commission, realizing its responsibility, deems itself fully warranted in the conclusions at which it has arrived. Messrs. Gray and Hering, our consulting engineers, each recognize and state that the waters of the bay are quite adequate for the purpose of effective dilution, although they recommend a different disposal as the best; whilst General Craighill, who was also consulted, with his special knowledge of the tides and currents of the bay, has expressed his conviction of their adequacy to effect the entire removal of the sewage without offense to any.

There would certainly appear to be but little reason why the city of Baltimore should deny itself the facilities and advantages which nature has vouchafed to it, and at great expense seek another method of disposal, lest pollution should be added to the waters of the bay, when, do what it may, the cities and towns along the shores of the bay and the great rivers which empty into it will continue to make use of it as they do now, emptying their sewage and other wastes at will. Ships will come and ships will go. They will drop all sorts of matter directly over and upon the oyster beds. It would be ridiculous to attempt to prevent it. May not Baltimore as well, without offense to others,

modestly purify herself in the broad waters of this great bay without thereby disturbing or annoying any existing interest? The commission thinks she may.

The complete system of sewerage recommended with disposal by dilution in the waters of the Chesapeake bay at the point indicated, may be affected by the expenditure of a sum, which it is estimated, will reach the amount of $6,166,667, by the time the outfall works are completed, and the reticulation system of laterals sufficiently extended to serve, say, 330,000 persons, a sum which will be increased from year to year, as the laterals of the reticulation system are extended, and more of the population brought in connection with it, until, when the whole city area is connected with the system, say by the year 1925, the cost will reach the estimated total of $10,495,167, these sums being respectively $1,706,040, and $6,981,636 less than the cost at similar stages of progress of the filtration method of disposal upon the lands of Anne Arundel county.

Whilst this economy of first cost is found in the disposal of the sewage into the Chesapeake, the saving of annual expense for interest, sinking fund and maintenance is no less marked in favor of such disposal. From the time the works are completed until the debt incurred for construction is paid off, the Chesapeake disposal will cost per annum, but about one-third of the annual cost of the filtration method, and when the debt is paid the annual cost of the Chesapeake disposal becomes less than one-third of the other.

How to Meet the Cost.

In view of the fact that taxation has in the past borne heavily on the citizens of Baltimore, the Commission deemed it best to discuss the additional burthen, which will be caused by undertaking the sewerage works now under consideration. If the recommendations of the commission be adopted by the city an expenditure estimated at $6,166,667 must be made before the new system can be opened to use in a partially completed state, and with a portion of the population connected therewith, or say 330,000. So much of the work might, perhaps, be accomplished in three years from date of closing the contracts for construction; but it is much more likely that five years will be consumed in effecting it. If so the average yearly expenditure will be $1,233,000 As the work will, of course, be paid for by the proceeds of a loan to be authorized and effected for the purpose, there must be raised by taxation the sum of $49,300 to meet the interest and sinking fund payments for the first year's outlay. This will increase from year to year as the work progresses, until at the end of five years

the works are opened for use. Of the amount thus far expended $2,032,500 will have been spent in constructing the district mains and laterals of the reticulation system. The cost of these it is usual in other cities to assess directly against the real estate benefited on the same principle or, rather, for the same reason that governs the assessment of cost for opening streets. Should the same method obtain here, the city treasury will be recouped by the end of five years, or shortly thereafter, in the sum of $2,032,500, advanced for this portion of the construction from the funds of the loan, and the sum so recovered will be, according to estimate, sufficient to carry forward to completion the main works, whilst the extension of the reticulation system will be paid for by assessment for benefits as before. From the time the works are first opened to service the current annual charges may be most readily met by annual sewer-rate charged against the property enjoying the benefit of sewer connection on a basis similar to that which obtains in the city's water department.

The total annual charges at first installation will be $247,288.39. The last report of the Water Department shows a total of 92,779 houses and warehouses, yielding revenue for the use of water at rates per house, varying from $3 up to $16. Assuming that the number of houses supplied with water, includes a small proportion outside of the city limits, the population served is probably not less than 520,000. If so, the population of 330,000 connected with the sewers at the outstart may, at the same ratio, be attributed to 58,879 houses. Now a sewer tax averaging $4.20 per annum for each one of these 58,879 houses will yield $247,291, a trifle more than is required to meet the annual charges for running and keeping up the works, paying the interest on their cost, and by proper payment to the sinking fund, extinguishing in fifty years the debt incurred for their original cost Although an average charge of but $4.20 per house is so small that it will be a burden to none, it may be well to show the large offset there still remains in the saving to property owners of the cost now incurred for cleaning cess-pools.

Vast Amount of Matter Removed.

The reports of the Health Department for the last three years show an average of 92,568 loads of filth removed from cess-pools cleaned each year. An inquiry made by your commission into the methods of doing this work has satisfied it that the reports do not show all the stuff removed. It has been stated that little or none from the Twenty-first and Twenty-second wards reaches the dumps, whence the tally is reported to the Health Department, and that an addition of ten per cent. to the amount reported to and by the department would not more than cover the

quantity diverted in violation of law from the proper dumping places. Nevertheless, neglecting any correction of the total number of loads of stuff reported as removed we find the 92,568 loads reported as taken away each year is just about one load for each house of about 92,777 houses and warehouses in the city. Now the charge made for privy cleaning is $2.50 for each load removed, so that while some pay more and others less, and some escape altogether, yet on an average each house owner pays $2.50 each year for this process. This, of course, will be saved when sewer connection is effected, so that the average annual cost to the average house owner will be but $1.70 more for the efficient service of the new system than is now paid annually under our existing method. This showing is based upon present conditions, and upon the assumed population of 330,000 that will be connected with the sewers when they are first opened for use. As the works are extended the house connections will increase, so that when the population reaches one million connected with the sewers, taking the same ratio of houses to population as at present, there will probably be as many as 178,000 houses from which to collect the revenue for the maintenance of the works, interest and sinking fund, the total of which is estimated for that period at $355,191.79. This will be more than met by an average house rate of $2.

When, after the lapse of fifty years, the cost of the works has been paid off through the operation of the sinking fund, an average house rate of one dollar will more than suffice to meet the estimated cost of maintenance. The construction of this system of improved sewerage will give the existing sewers or drains no other functions to perform than the carrying off of storm water and street washings. The latter, unless intercepted by proper catch-basins, will still reach these drains as now, and will be carried along with the storm water through them to the basin, to Jones' falls, or directly to the river, from which they will be removed by periodic dredging, as at present. All domestic sewage, however, including water-closet drainage, will be cut off and intercepted by the new system. The flooding of sidewalks and street crossings with bath and laundry water in the winter season, when the gutters are obstructed by ice, will no longer be characteristic of our city.

It may be safely anticipated that, with the removal of the large quantity of organic matter which is now discharged into them, the offensiveness of the basin and the harbor generally, now so serious a cause of complaint, will entirely disappear. The emptying and cleansing of all existing cess-pits, promptly followed by the filling of the empty pits with clean material, will surely produce in our city, as it has invariably done elsewhere, an improvement in the general health of the city, and a marked

reduction in the death rate. The sub soil drainage of the low grounds of the city, which will be an important feature of the system now recommended, should improve the health of the localities so drained, and should, according to all experience, have notable effect in lowering the death rate from consumption; at the same time it will render available for storage and business purposes basements and cellars, which at present are quite useless. Thus will be enchanced the value of property in sections of the city which have suffered by reason of the difficulty of introducing improvements now generally regarded as essential.

General Recommendations.

Should this report and its conclusions be accepted by the Honorable, the Mayor and City Council, it is respectfully recommended, that this or another commission be authorized, with the aid of the City Solicitor, to prepare an enabling act to be submitted to the General Assembly of Maryland, at its approaching session, so that by the adoption of such Act, the city may be enabled to commence the work of construction with as little delay as possible. Also, that without waiting for the final ratification of such enabling act, a competent civil engineer be appointed as chief engineer, who, with the aid of necessary assistants, shall at once proceed to make a definite location of the works here recommended with revised estimates, so that there need be no delay in letting the work, should it be authorized by the Legislature and the people. Such careful revision will only result in effecting economies that cannot at this stage be anticipated. It is further recommended, that no additional storm-water drains or so-called sewers, nor extensions of any already existing, be authorized without the approval of such chief engineer, in order that wasteful and unnecessary expenditure of public money may in the future be avoided.

Inasmuch as the location of the main gravity intercepting sewer with a continuous flow of sewage from the extreme western section of the city to the outfall in the bay, will naturally admit of but very slight deviation from the natural gradient adopted, and but slight, if any, change from the streets which such gradient will determine, it is recommended that no future subway work be undertaken by other departments without consultation with such chief engineer, in order that unnecessary interference and increased expense may be avoided.

The Commission would here remind the Mayor and City Council, that at least twice before has the city of Baltimore undertaken to investigate the sewerage problem.

Under Mayor Thomas Swann, a joint resolution, approved September 26, 1859, appointed a commission to investigate the sub-

ject. This commission reported in 1862, but no action seems to have been taken thereon.

Under Mayor Ferdinand C. Latrobe, a joint resolution, approved February 8, 1881, authorized the appointment of a civil engineer to examine and report upon the question of establishing a general system of sewerage in the city.

Under this resolution Mr. C. H. Latrobe was appointed. His report was made to the same Council; and, although a joint committee to which it was referred seems to have recommended the carrying out of his plans, we have no evidence that any steps in this direction were ever taken.

Now the problem has again been submitted to the members of the present commission, who have had the responsibility of disbursing a large amount of money in the work, and who have given assiduously their own time and labor to its investigation and determination.

The Commissioners venture to hope that some definite action will be had upon this report, and if its recommendations meet with approval, that steps be at once taken towards the construct tion of the works.

THE RELATION OF SEWAGE-DISPOSAL TO PUBLIC HEALTH.

By William H. Welch, M. D.

I am somewhat perplexed how to treat the subject assigned to me for, although it is a very broad one, its various parts have been so parcelled out that those who are to follow will take up most of the points which would naturally fall within my theme.

The basis of modern sanitation is the recognition of the fact that certain diseases, particularly those called infectious, are preventable. So familiar is this conception, that it is difficult to realize that it is essentially of modern origin. While it is true that in all ages there have been enlightened physicians to whom this conception of the preventability of disease was not entirely foreign, nevertheless, the prevailing opinion in ancient and mediaeval times referred the origin of epidemic diseases to such supposed causes, as the anger of an offended Deity, the influence of the planets and of comets, poisoning of wells by the Jews, some mysterious epidemic constitution of the atmosphere, etc. Under the control of such ideas, it is clear that public and private sanitation could not develop. Certain great public works of antiquity to which we must attach hygienic value, such as the monumental aqueducts and drains of ancient Rome, were undertaken for public convenience and not with any clear appreciation of their relations to public health.

The doctrine of the preventability of infectious diseases was first established upon a firm basis by the collection and analysis of vital statistics. This great contribution to preventive medicine we owe to the establishment of the Registrar General's Office in England, in 1838, concerning which an English hygienist has justly said: "It is impossible for any nation or for any government to remain indifferent when, in figures which admit of no denial, the national amount of health and happiness, or disease and suffering, is determined. The establishment of the Registrar General's Office, in 1838, and the commencement of the system of accurately recording births and deaths, will hereafter be found to be, as far as the happiness of the people is concerned, one of the most important events of our time."

The impetus which led to this systematic collection and study of vital statistics, as well as to other great sanitary reforms, was the invasion of Asiatic cholera for the first time into Western Europe in 1831. The careful study of the mode of spread of this pestilence led to the clear recognition of the fact that it is a preventable disease, and it was soon discovered that the same conception is applicable to typhus fever, typhoid fever and many other infectious diseases. Cholera has destroyed millions of human lives, but it has been the indirect means of saving millions more. The visitation of great epidemic diseases, such as cholera and yellow fever, has been one of the levers of progress in modern sanitation. Although we have constantly with us diseases, notably typhoid fever, which teach the same lessons, and are as preventable as cholera, it has often required the violent impressions of the outburst of some rapidly spreading and strange pestilence to stir a community to undertake sanitary improvements, whose necessity has been long pointed out by sanitarians. We in Baltimore can, if we choose, wait to receive such a violent lesson, but it is the part of wisdom and prudence to profit by the same lesson which existing circumstances teach no less distinctly, even if with less impetuosity.

It is fortunate that those who instituted the first public sanitary measures did not wait to find a thoroughly scientific basis for them. Even in this day, with our greatly extended knowledge of the causation and mode of spread of infectious diseases, there are many proved measures for preventing the development and spread of disease, for which we cannot give an entirely satisfactory scientific explanation. We must utilize the results both of practical experience and of scientific investigation in determining the character and the efficacy of sanitary procedures.

The early English sanitarians based their practical sanitary measures upon a belief in the efficacy of cleanliness in preventing the development and extension of infectious diseases, and they directed their efforts especially to securing pure soil to live upon,

pure air to breathe, pure water to drink, and pure food to eat. While modern bacteriology has taught us the particular impurities in our environment most to be dreaded, and consequently better means to guard against them, this programme of the early sanitarians remains to this day the broadest and most satisfactory basis of preventive medicine.

While the great media of our environment, soil, water, air and food, are so intimately associated in their sanitary relations that impurities of one are likely to affect others, my theme on this occasion relates especially to the dangers of pollution of the soil.

The soil is the place to which sooner or later all organic matter returns. From it comes all life, and to it all life returns. "Dust thou art, and unto dust shalt thou return," embodies a profound scientific truth. The soil is the greatest laboratory in the world. It is there through the agency of microscopic organism that organic matter derived from plants and animals is decomposed and converted finally into the simple inorganic substances which make the food of plants. The plants again build up these simple mineral constituents into the complex organic materials of their bodies, which make the food of animals. In this continual circulation of materials, agencies at work in the soil play an indispensable part, a part so essential that if this link in the chain should drop out all life upon this globe would cease in a comparatively short time.

It is through these agencies, which are chiefly living micro-organisms present everywhere in the soil, that the soil is able to dispose of organic matter which it receives and thus continually to purify itself. Upon this principle is based the method of disposal of sewage by irrigation and by filtration through the soil. But there is a limit to the capacity of the soil to convert organic material into a harmless state, and if this limit is exceeded, we have a polluted soil. There are likewise various circumstances, which cannot be considered here, which influence the rapidity and extent of this process of self-purification. For example, when the organic material is not received upon the superficial layers of the soil, but leaks out, as through cess-pools, into the deeper layers, the process of purification is much slower and less efficacious. In this way the soil may become contaminated to great depths, and may bring serious injury to people living upon it. There are various artificial conditions, such as pavements, which renders much of the ground in cities incapable of doing the work of virgin soil in transforming organic waste.

Now what are the dangers of such contamination of the soil? Some of these dangers we can point out with reasonable certainty; others, which we have every reason to believe exist, in view of certain benefits which regularly follow purification of the soil, we understand at present either very imperfectly or not at all.

Pettenkofer has called especial attention to the fact that the air in the lower parts of our houses is derived in no small part from air drawn in from the ground, unless the special construction of the cellars prevents this. If this ground air comes from a polluted soil, it contains foul gases, the precise influence of which upon the health of the inhabitants it has not yet been found possible to determine, but there is reason to believe that it may be injurious, and certainly it must be regarded as offensive. That such air, under certain circumstances, may contain disease-producing microorganisms, is highly probable. When the soil has become saturated with illuminating gas derived from leaky or broken gas pipes, the air of houses in the neighborhood may become so contaminated with gas drawn in from the soil, that serious poisoning of the inhabitants may result, as has repeatedly been observed.

The view is widely held that serious contamination of the soil is injurious to the health of those living upon it, independently of the actual presence in such soil of the specific germs of disease. Exposure to such influences is thought to be capable of impairing mental and physical vigor and in general of lowering resistance to disease. Among the various factors which determine the higher death rate in many crowded and insanitary localities, pollution of the ground is doubtless one of importance.

It is, however, more especially in the presence of the specific micro-organisms which cause infectious diseases that we have to seek the chief dangers from contamination of the soil with human and animal excreta and household waste. Without proper methods of disposal of sewage abundant opportunities are afforded for the escape of such pathogenic micro-organisms into the soil.

The fate of such organisms after they have reached the soil is various. It has been demonstrated that the bacilli of tuberculosis and of typhoid fever may survive months, perhaps even years, and that those of cholera may persist for weeks in the soil. Whereas in virgin soil they do not find requisite food for their multiplication, the bacilli of typhoid fever may actually multiply in soil contaminated with organic material.

Having once reached the soil these disease-producing germs may be conveyed to us in manifold ways. An important medium of transportation of bacteria from an infected soil is the water which we drink or use for domestic purposes. Our chief interest here in Baltimore in the contamination of drinking water from the soil relates not to our own soil, save in the occasional use of wells, especially in the recently annexed districts, but relates to that bordering on the streams and reservoirs from which we receive our naturally excellent drinking water. It is, therefore, not necessary to dwell upon this point on this occasion.

Among the various other ways by which harmful bacteria may reach us from contaminated ground it will suffice to specify their conveyance attached to particles of dust in the air, their transportation by flies and other insects, and by domestic animals, their presence upon vegetables, especially those eaten uncooked, and our own direct contact with the soil. It is evident that the possibilities of infection from soil contaminated with disease germs are numerous and often intricate.

The list of diseases whose causation has been shown to stand under certain conditions in more or less direct relation to contamination of the ground with their specific germs is a long one. Among the more important may be mentioned malaria, typhoid fever, cholera, yellow fever, dysentery, tuberculosis and the summer diarrhœas of infants. Experience teaches unmistakably that contamination of the soil with organic refuse favors the development and spread of such diseases as these, and that drainage and purification of the soil by proper systems of sewerage are among the most effective measures for their prevention.

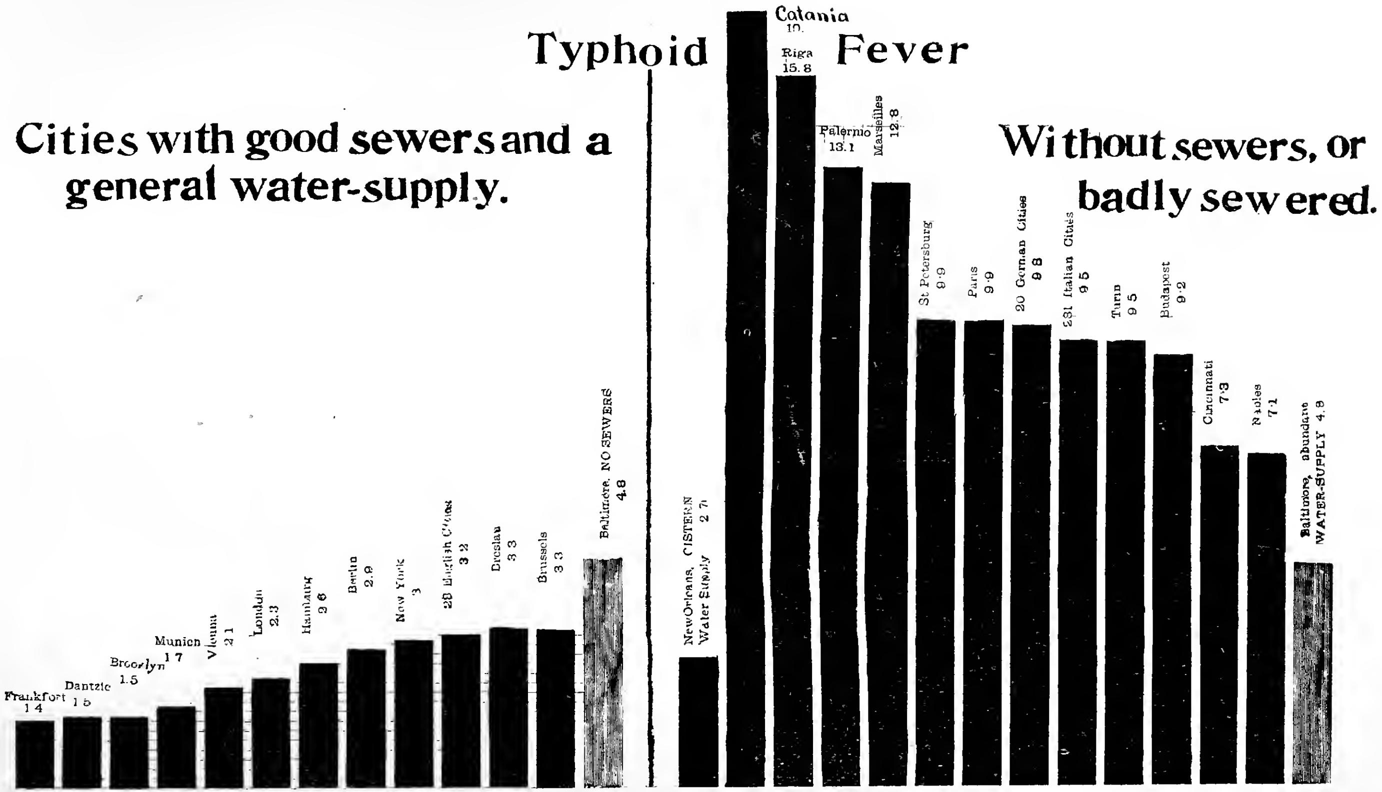
No more instructive illustration of the value of modern methods of public sanitation can be found than the inability of Asiatic cholera to secure a foothold during the last two European epidemics in clean cities, with proper sewerage and water supply, and its ravages in notoriously filthy or insanitary cities such as Toulon, Marseilles, Naples and Hamburg. The public should realize that quarantine is an extremely vexatious, expensive and uncertain means of protection, and that far greater safety can be secured by measures which render a city unsuitable for the multiplication and distribution of the germs of epidemic diseases. A city can make itself cholera-proof by well-understood sanitary measures.

Insanitary conditions, to adopt a metaphor employed by Pettenkofer, represent the powder and the germs of cholera or typhoid fever the sparks. It is wiser to keep no powder of this sort than to engage in frenzied and often futile efforts to drive away the sparks which, if they reach the powder, will cause a destructive explosion.

Although the nature of the relationship between the conditions of the ground and the prevalence of tuberculosis is not well understood, practical experience has shown that many localities have secured, by good drainage of the soil, great reduction in the mortality from this most deadly scourge of the human race—a reduction amounting in some places to nearly 50 per cent. of the former death-rate. Similar measures in Berlin and elsewhere have notably lowered the mortality among infants, particularly from summer diarrhœa.

I call your attention to these various charts hung upon the wall, which illustrate some of the beneficial results which have been

DIAGRAM VII.



AFTER THE CHART OF DR. E. F. SMITH.

secured by purification of the soil through proper systems of sewerage. The charts speak for themselves.

Upon this one the black column represents the average number of deaths from typhoid fever in 313 cities without sewers, and the next column, less than one quarter of the first in height, shows the deaths in 39 cities with efficient sewers. (Diagram VII.)

This chart shows on the left side the deaths from typhoid fever to each 10,000 inhabitants in each of a series of cities with good sewers and a general water supply, and upon the right side the deaths from the same cause in cities without sewers, or very imperfectly sewered. You will observe that the average in the first series is 2.4, and in the second is 10, with many cities lower than the average in the first series, notably Munich, Dantzig, Vienna, and Frankfort, and many higher than the average in the second series, notably several Italian cities.

Especially instructive is the next chart, (Diagram VIII) which shows the experience of Munich during the gradual improvement of an originally highly contaminated soil. During the first period represented, when the inhabitants drank water from wells and the excreta were stored in ordinary privy vaults, the death rate from typhoid fever was 24.2 per 10,000 inhabitants. On the same chart Dr. Fulton shows you, from the experience of Berlin, how the prevalence and mortality of typhoid fever in unsewered houses compares with its prevalence and mortality in sewered houses; the black columns representing the number of deaths, and the hatched columns the number of cases. By systematic and intelligently directed sanitary improvements the cities of Munich and of Vienna have been converted from hot-beds of typhoid fever to places from which this disease has heen practically eradicated. All of the money which they have expended in carrying out these great sanitary reforms has been repaid a hundredfold in the increased health, happiness and productive capacity of the inhabitants, and in the increased value of property.

The same results can be secured by Baltimore and other cities, as is demonstrated by Diagram IX, which shows for Dantzig, Breslau, Frankfort, Berlin, Vienna, Brussels, London, New York, Boston, Brooklyn and other cities, the deaths from typhoid fever to each 10,000 inhabitants before, during and since the introduction of sewerage and general water supply. You will observe that the experience has been everywhere the same, lowering of the death rate to a quarter, a sixth, an eighth, a twelfth, even a twentieth of the former rate.

This hatched line (Diagram VII) represents the mortality from typhoid fever in Baltimore. It is the official mortality from this disease. The actual mortality is considerably higher, for, as Dr. Osler has pointed out, doubtless most of the deaths in this city returned to the Health Department as from malarial fever and

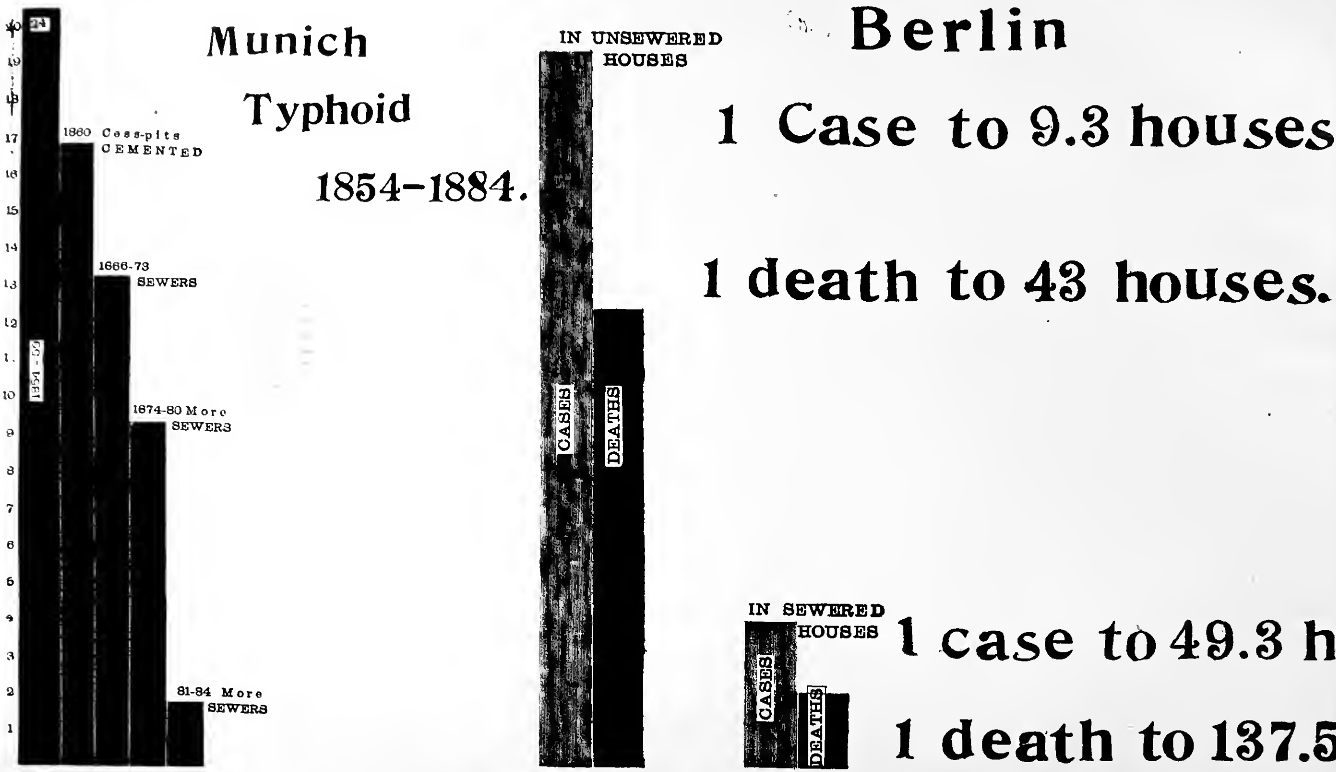
from typho-malarial fever are in reality due to typhoid fever. The death-rate from typhoid fever in this city, as he has shown, is that which belongs to an unsewered city with general water supply, and it can be confidently predicted that the introduction of efficient sewerage and the protection of the sources of our water supply will reduce this mortality to the low rate of well sewered and well-watered cities.

The reduction in typhoid fever shown by the charts, can not be attributed wholly to the introduction of good sewers. In many instances it has been due mainly to the introduction of a general supply of pure drinking water. Authorities have differed as to the relative value of sewerage and of water supply in influencing the prevalence of typhoid fever. We need not pause here to discuss this matter. Both factors are important, the drinking water usually the more important. But it is sufficient for our purpose to show that purification of the ground by proper disposal of sewage, is one of the factors in determining a reduction in the occurrence of typhoid fever and other diseases.

It is by no means an easy matter in all cases to assign to each one of the various recognized elements which go to make up an entire system of satisfactory municipal sanitation its due share in the beneficial result, for it rarely happens that one is introduced by itself alone, and the harmonious working of the whole system is often necessary to secure the best results from the individual factors, such as pure water supply, efficient sewerage, good drainage, cleanliness of streets, improvement or removal of insanitary quarters, thorough sanitary inspection of dairies and food-stuffs, public disinfecting establishments, hospitals for infectious diseases, municipal laboratories, etc. In some instances, however, the conditions have been such as to furnish conclusive demonstration of the separate influence of the introduction of effective sewerage upon the death rate from typhoid fever. This is notably true of Dantzic and Stockholm as is illustrated by these charts. In the former city, (Diagram IX) a high death rate from typhoid fever persisted after a good general water supply, but after the introduction of the system of sewerage it fell from nearly 10 per10,000 to 1.5. You will observe in this striking chart, (Diagram VIII) how in the city of Stockholm the mortality from typhoid fever fell *pari passu* with the gradual extension of the sewerage system, reaching in 1887 the low figure of 1.7 per 10,000.

Much more evidence might be adduced, if it were necessary, to show the beneficial influence of good sewerage upon the health of a community, but enough has already been said to demonstrate the hygienic importance of proper disposal of sewage. Indeed it might seem unnecessary to dwell upon these matters upon which sanitarians are agreed were it not that public indiffer-

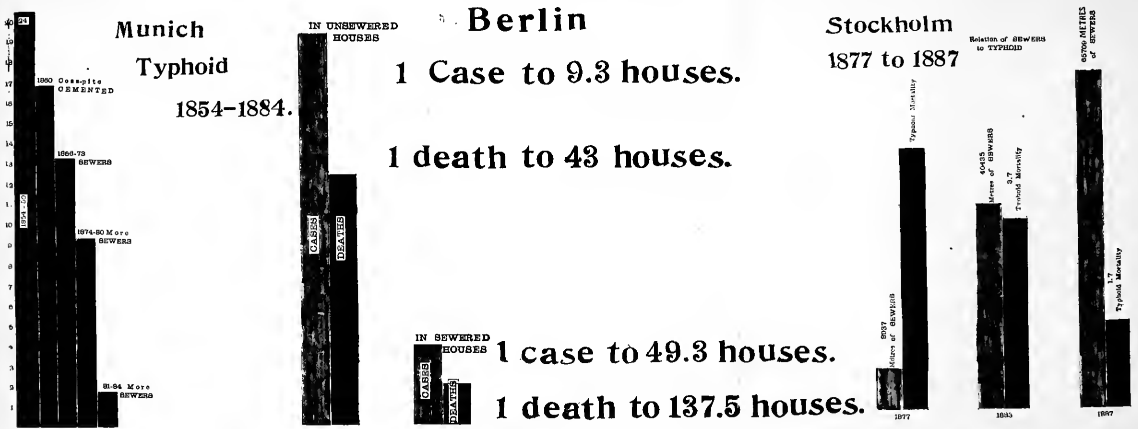
DIAGRAM VIII.—*Fulton, 1897.*



RELATION OF TYPHOID FEVER AND SEWERAGE.

problems involved, to enable the reader to form an intelligent

DIAGRAM VIII.—*Fulton, 1897.*



RELATION OF TYPHOID FEVER AND SEWERAGE.

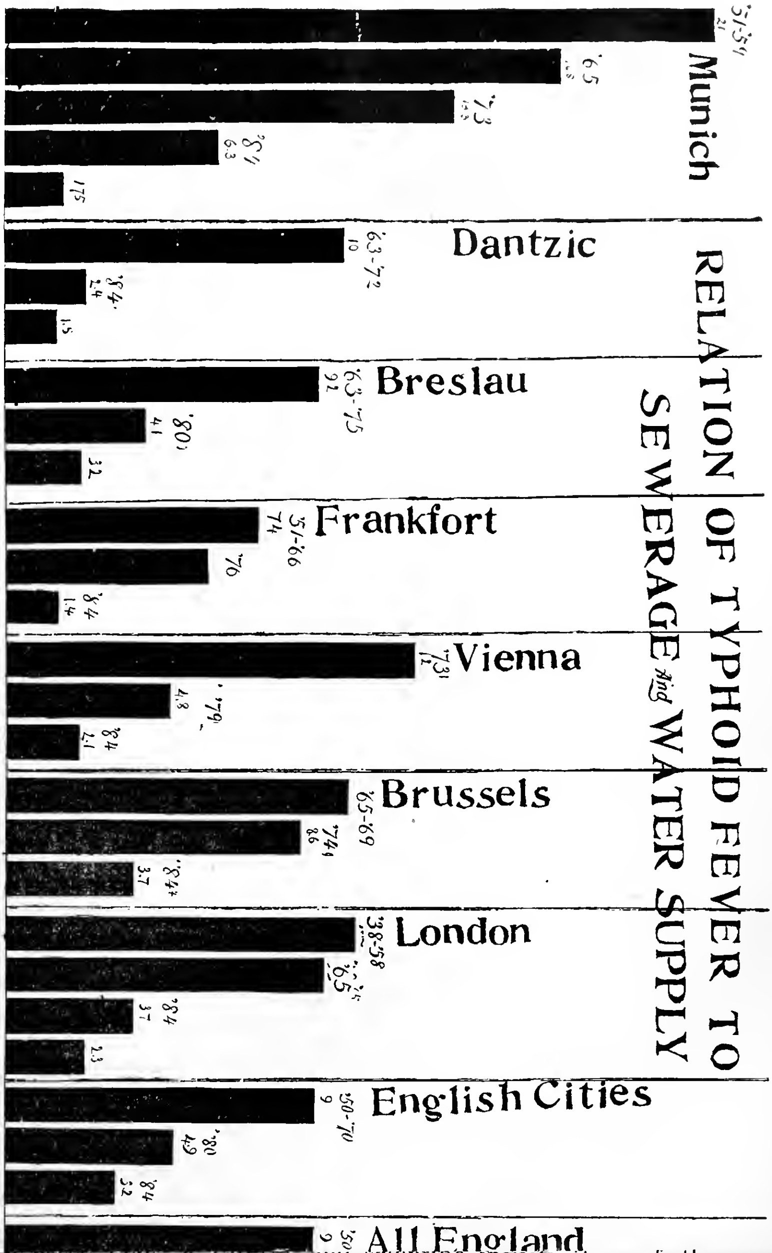
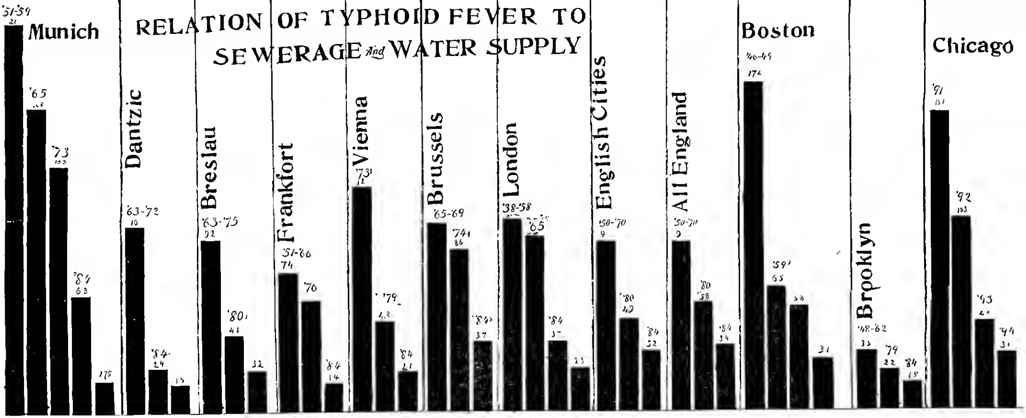


DIAGRAM IX.—*Fulton, 1897.*

based upon a careful and scientific investigation of the problems involved, to enable the reader to form an intelligent

DIAGRAM IX.—*Fulton, 1897.*



ence to this subject indicates lamentable ignorance, although for two generations the gospel of public sanitation has been preached to this city by its health officers and others. Trite and wearisome some as the tale may be, it is one which must be told and retold, and we cannot choose but hear until the end desired is attained.

But it is not necessary or even desirable to rest the argument for an efficient sewerage system exclusively upon its effects on public health, important as these are. Quite apart from the large saving of human life, the proper disposal of exereta, household waste, water and garbage, contributes so much to the comforts, conveniences and even decencies of living, and so essential a part of such disposal in large cities is a good system of drains and sewers, that it is positively uncivilized for a modern city to be without the advantages of such a system. The conditions in this respect here in Baltimore, with its leaky and overflowing surface drains, with its utterly insufficient storm water drains, with one-twentieth of its area, exclusive of streets and parks, occupied by privy pits and cesspools, permitting often overflow and leakage into the ground and cellars, with arrangements by which sewage and garbage are allowed to befoul the streams and the harbor basin—are obnoxious in the extreme. That greater damage to health and property has not been the result of these primitive conditions is due in large part to the natural salubrity of the city and the configuration and character of the ground.

Mr. Mendes Cohen, in a published address delivered before the Taxpayers' Association of Baltimore about six years ago, pointed out very clearly and forcibly the injury to property caused by the defective drainage of this city, and he showed how the rental value of property would be so much enhanced by the introduction of good drainage that a large share of the necessary cost of the improvements would be thereby covered. Dr. Fulton will tell you this evening something about the loss in money due to sickness and death entailed by the present conditions, and the estimated pecuniary gain which can reasonably be expected to follow the establishment of a good system of sewers. But who can estimate the suspense, the suffering, the grief, the despair caused by the unnecessary sickness and sacrifice of life through neglect of the plainest laws of sanitation?

The immediate occasion of our assembling this evening upon the call of the physicians and sanitarians of this State is the consideration of the recently published Report of the Sewerage Commission of the City of Baltimore, of which an abstract has been presented to you by Dr. McShane. Those who are to follow me will discuss the details of this report. It seems to me to be an admirable document, supplying as it does the necessary data, based upon a careful and scientific investigation of the problems involved, to enable the reader to form an intelligent

judgment upon the subject. It would be a great misfortune if the city of Baltimore should not take advantage of this opportunity to come to some definite solution of this problem, which must be solved sooner or later, and which becomes more complicated the longer it is deferred. It behooves our citizens and, above all our legislators, to give earnest heed to this matter, and to see to it that this report does not remain as fruitless in practical results as did its predecessors.

THE RELATION OF TYPHOID MORTALITY AND SEWERAGE.

By Dr. William Osler, of Baltimore.

My text is the trite statement, that *typhoid fever is the sanitary index of a city.* I will consider the question briefly under three headings:

First. *The mortality from typhoid fever has everywhere progressively declined with improvements in the sanitary conditions.*

In 1838, 1,228 persons died of fever in England, typhus and typhoid, per million of living. Twenty years later the figures were reduced to 918; in 1878 to 306 of typhoid and to 36 of typhus fever. In 1892 only 137 died of typhoid fever, and only three of typhus per million of living. In London the death rate per million of living was 307 in 1869; in 1892 it was 102. Three factors have been concerned in this extraordinary saving of life—the cleansing of towns, the purification of water supplies, and the introduction of good sewers.

Secondly. *The death rate from typhid fever forms an accurate measure of the efficiency of the sewage removal and the pureness of the water supply.*

Mr. J. H. Hill, an engineer, has recently tabulated the statistics of sixty-five cities with reference to the death rate from typhoid fever during the five years 1890 to 1894, inclusive, and has grouped them into seven classes. I am sorry to say that Class I comprising thirteen cities which have a death rate from typhoid fever under 10 per 100,000 living, contains no American city. On the other hand in Class VII, which comprises thirteen cities with a death rate from typhoid fever over 60 per 100,000 inhabitants, all are in this country except Milan, Cairo and Alexandria. The lesson of several of the European cities is worth reading. I can only take time to refer to Munich. The mortality per 100,000 inhabitants in that city in 1857 was 291, and kept at a high

rate until about 1865, when there was an improvement in the water supply, with a reduction of almost 50 per cent. in the number of cases of typhoid fever. After the introduction of the new system of drainage the mortality was still further reduced, and in 1887 it was only 10 per 100,000 of the inhabitants. (Diagram IX.)

Thirdly. *Baltimore has a typhoid fever death-rate of a fairly well-watered but unsewered town.*

During the years 1893, '94, '95 and '96, 908 persons died of this disease, an average of 227 yearly. Prior to the introduction of a good water supply the death-rate was 74 to 80 per 100,000 of the inhabitants; figures now reduced to about 41. Good water alone is not sufficient, as shown by the experience of the cities of Dantzic (Diagram IX), and Stockholm (Diagram VIII.) In the latter the death rate from typhoid fever fell *pari passu* with the number of meters of sewers—from 51 per 100,000 inhabitants in 1877 with 8,937 meters of sewers to 17 deaths per 100,000 inhabitants in 1887, with 65,709 meters of sewers. We may *confidently* expect, with the completion of a good sewerage system, the present death-rate of Baltimore, about 40 per 100,000, to fall to that of the cities of the first class, from 4 to 8 per 100,000 inhabitants.

What does it mean in cold figures that 204 persons died in Baltimore last year of typhoid fever? The loss to a community of a person in the prime of life may be placed at $2,000. The total funeral expenses would amount at a low estimate to $5,000. About 12 per cent. of the attacked die, so that the total number of cases of typhoid fever last year in the city may be placed at about 2,500. The loss in wages at $1 per day during the illness may be estimated at over $100,000. Nursing and doctors' bills, estimated at the low rate of $25 per case, gives $62,500—a year's fever bill of about $575,000 against the city of Baltimore for one disease—a sum sufficient to pay the interest on the most expensive plan of sewerage presented by the commission.

The penalties of cruel neglect have been paid for 1896—the dole of victims for 1897 is nearly complete. The sacrifices will number again above 200. We cannot save the predestined one of 1898, but what of succeeding years? From which families shall the victims be selected? Who can say? This we can predict—they will be of the fairest of our sons and of our daughters; they will not be of the very young or of the very old, but the youth in his bloom, the man in the early days of his vigor, the girl just wakening into full life, the young woman just joying in the happiness of her home—these will be offered to our Minotaur; these will be made to pass through the fire to the accursed Moloch. This, to our shame, we do with full knowl-

edge, with an easy complacency that only long years of sinning can give. It is not likely that we can abolish typhoid fever completely, as we have abolished typhus, but we can reduce it to a minimum, and if the experience of other cities is worth considering, this will be effected by the introduction of a complete system of sewerage; and, moreover, the total cost of any plan, however, elaborate—however costly, would be fully reimbursed in the course of a few years by the saving of life and of unnecessary expense in typhoid fever alone.

THE INFLUENCE OF CRUDE SEWAGE UPON ANIMAL LIFE IN THE BAY.

By Prof. William K. Brooks, of Baltimore.

I have been encouraged to speak on a subject that is a little out of my field, by the late Dr. James Carey Thomas. Only shortly before the death of Dr. Thomas, I had an opportunity to converse with him, and he assured me that on some suitable occasion within a short time he himself would undertake to say what I shall try to say now. I had hoped that this would be the occasion when Dr. Thomas would address you; but I will try to give you briefly the substance of our conversation, which, put in a nut shell, is this: So long as we take oysters from the Chesapeake Bay and eat them, the disposal of the sewage of the towns and cities on the bay is practically the problem of contamination of drinking water.

Every oyster in the bay is engaged day after day throughout the year, all day and nearly all night, in drawing into its shell a stream of water, filtering this through its gills, and then discharging this stream of water again. This stream can be traced for five or six feet away from the oyster by the disturbance it produces in the water. In fact, I think it is hardly an exaggeration to say that every drop of water that enters the Chesapeake Bay from the Susquehanna river has a good chance to be filtered through the gills of an oyster before it reaches the ocean. After the oyster draws this stream of water into the shell, the water passes through microscopic pores over the surface of the gills, and out again through the vent-pipe. During this process all microscopic organic life, or most of it, is filtered out. This is so true that those who manage aquaria have long been aware that water which has been filtered by the fresh water mussel is peculiarly adapted to their uses, because it does not contain the germ of the green algæ, which grow so profusely upon the sides of glass vessels, this material being so perfectly taken out by the mussel

that the glass remains clean for a long time. The oyster does the same thing. These organisms, instead of going through the pores of the gills with the water, are entangled in the cement which the gland cells of the gills are continuously pouring out, and they are pushed along until they reach the mouth of the oyster, and are passed along into the stomach, where they are ultimately digested and converted into the wholesome substance of the oyster. In the meantime the oyster may contain great numbers and a great variety of organisms in transit from the gills. Now, I should be very sorry to have anyone infer from this that raw oysters are not good food. They are good, wholesome food for man; but, unfortunately, the oyster does not discriminate in its diet. All bacteria are not pernicious; some are just as wholesome as lettuce or other vegetables. I have had under the microscope little oysters so small that the shell was transparent, and I have seen the bacteria whirling about in the stomach of the oyster. Pernicious bacteria would, of course, be gathered up and ultimately carried through this process just as wholesome ones are. It is said that sewage discharged into the Chesapeake Bay would be so diluted in the water that the chances of infection through the oyster would be hardly worth considering. Now, I think we would all of us drink a glass of water from a stream a long distance from a source of pollution, but we would not eat a piece of filter paper through which great quantities of that water had been filtered.

The old microscopists were very much interested in a group of microscopic organisms, many of them of great beauty, which exist in endless quantity in bodies of water, fresh and salt, and they quickly discovered that many marine diatoms, which were very rare, could be found by cutting up the stomachs of oysters and washing out their contents. That particular hunting ground was worked for a long time to get specimens of these very rare forms, which could seldom be found in any other way. I think all who are familiar with the part the oyster plays in the economy of nature will not feel at all surprised if infectious diseases are sometimes traced to that source, but this subject attracted very little attention until quite recently. It was only about five years ago, 1893, that a number of cases of cholera, scattered over a pretty wide area of the interior of England, were very definitely traced to infection through the consumption of raw oysters that had been placed to fatten in a stream near the opening of some sewers. About a year later, a young man who had been trained in this university, went to Wesleyan University. Twenty-six students were attacked with typhoid fever. All of these students had partaken of oysters which had been taken from a certain locality near the mouth of a sewer. Professor Conn studied these cases, and

proved conclusively that this outbreak of typhoid fever was caused by raw oysters. Soon afterwards fifteen persons in five houses of a small town in France, where no typhoid had occurred for a long time, were attacked with typhoid fever, and it was found that all of them had partaken of oysters from one barrel, and that nobody who had not eaten of the oysters, either in those houses or anywhere else in the town, suffered from the disease. These few instances, so carefully and completely studied, and coming so close together, attracted so much attention, that last year the local governing board of Great Britain employed a student, Professor Cline, to carry on a series of experiments with oysters, to see how far and under what conditions this infection through oysters could occur. The first step was to find how long typhoid bacteria and the cholera germs could live in sea water, as it had been supposed that sea water itself would exert destructive influence upon the germs of disease. A number of flasks filled with sea water were inoculated, some with the typhoid germ and others with cholera, and they were kept under observation for a period of three or four weeks. During all this time it was found that the cholera and typhoid germs persisted alive in the sea water, and while there was no evidence that they multiplied, yet the rewas no destruction; and cultures made at the end of this time, in case of the typhoid germ, were just as pernicious physiologically when used to inoculate animals, as the germs were at the beginning of the experiments.

Another experiment was tried in this way: A number of three gallon aquaria were filled with sea water and a dozen oysters placed in each. Some of the aquaria were inoculated with typhoid, others with cholera, and the water was kept pure by drawing off each day one-third of it, one gallon out of the three, and replacing that by a gallon of fresh sea water, so that the volume of water was changed over and over again during three weeks. At intervals of this time, oysters were removed from the tank, carefully washed to remove any germs on, but not in, the oyster, wiped and dried, and from the juices inside the shell and the crushed particles of the shell, cultures were made. In every case it was found that up to twenty days or more these cultures of typhoid had lost none of their power. In the case of cholera, this was not quite so marked. The germ had lost some of its virulency. These results prove that the germs of typhoid and cholera may live for a period of three weeks or more in sea water; that they may be taken up by oysters, and that epidemics of these diseases may arise and spread from the oyster beds. Another interesting thing shown by these experiments was, that so far as the oysters themselves were concerned, no harm was done at the end of three weeks, the oysters being then as healthy and marketable to all appearances as any oysters kept that length of time would have been. The

oyster is not injured by micro-organisms that are injurious to us any more than by those that form its normal food.

Now, it must not be supposed, that the danger of acquiring typhoid fever through the consumption of oysters, is very great. The Chesapeake bay is an enormous body of water and the chances are very slight, that any particular oyster should have gathered up the germs of typhoid or cholera, and should have them on its gills when caught and taken to market, and that it would be eaten raw by a person at that time unable to resist the disease. The chances of such an occurrence are slight, of course, but it seems to me that as the greatest industry, or the most characteristic industry of this State is the oyster industry, (and we can make it not only the most characteristic but the most important industry in the State), and as we are exposed to some danger through the consumption of raw oysters, I think it is proper, before any decision is reached as to the ultimate disposal of sewage from the towns and cities on the bay, that this particular aspect of the problem should be investigated, so that we can determine just how dangerous it is. We must determine whether it is advisable to adopt a scheme of sewage disposal, which, while it may not make the dangers any greater, would not relieve us of this source of danger. Even the imputation of unwholesomeness would result in an enormous injury to our oyster business. The business of exporting American oysters to Europe is now being developed, and foreigners would be very ready to become suspicious of our oysters. In studying the history of these experiments, conducted under the Local Governing Board of Great Britain, I found something which shows this very well. Professor Cline says he received two lots of the oysters gathered from where there might have been contamination by sewage. One lot came from East river and the other from the North sea. Professor Cline made cultures from all these oysters, and in the lot from the North sea he obtained typhoid germs in abundance. Now the officer of the local governing board in his preface to this report, which has been printed by the English Parliament, says that Professor Cline showed that American oysters might carry typhoid to England. The report really shows just the opposite, but in some way the facts were turned around so that the blame was laid upon the American oyster, and this illustrates how slight a danger might be a serious blow to our oyster industry.

METHODS OF SEWAGE DISPOSAL.

By George H. Rohe, M. D., Baltimore.

The speakers whom you have heard, and Dr. Fulton, who is to follow, have made my task an easy one. The report of the Sewerage Commission contains all the facts necessary to enable any citizen to decide for himself, what plans should be adopted by the city. A careful study of the report will show, however, that engineers as well as doctors may disagree. The consulting engineers, after a careful study of the problem, recommend the disposal of the sewage by filtration on land. The Commission itself, supported in its conclusions by General Craighill, has recommended the discharge of the sewage into the Chesapeake bay, at a distance of about twelve miles from the centre of the city. The reasons given by the Commission for its recommendation are, the less cost of the first construction of the work, and the less expense of maintenance. There can be no doubt that, other things being equal, a saving of seven millions of dollars in the complete construction of the works, and over six hundred thousand dollars annually in maintenance, should be decisive in favor of discharging the sewage into the bay. There is grave doubt, however, whether this method of disposal of the sewage would be effective. Reference is made in the report to the experience of Chicago; which city, by discharging its sewage into lake Michigan, so fouled the lake near shore, as to make it absolutely necessary to expend an enormous sum, estimated at thirty-two millions of dollars, for the construction of a drainage canal by way of the Des Plaines and Illinois rivers into the Mississippi. The report also refers to the fact, that the city of London treats its sewage by chemical precipitation. It fails, however, to state that London had discharged its sewage into the Thames about ten miles below London bridge. It was found, after some years experience, that the tidal flow in the river carried the sewage up-stream to near the centre of the city. In the report of the Commissioners on Metropolitan Sewage Discharge, in 1884, it was stated that the Thames from Greenwich pier to Woolwich, both points above the sewage outlets into the river, was "a disgrace to the metropolis and to civilization," and they expressed the opinion that "some of the sewage must have reached within a short distance of London bridge." The intolerable nuisance, created by the discharge of the sewage into the Thames, had made it necessary for the city of London to supplement its former elaborate disposal works with arrangements for chemical precipitation. It was also found by this same English Commission that there were large deposits of mud

in the Thames above the sewage outfall, consequent upon the discharge.

It is true that the volume of sewage of the city of London is much larger than that from the city of Baltimore will probably ever be; besides, the volume of water discharged by the Susquehanna, and available for dilution, is very much greater than that of the Thames. Nevertheless, the unsatisfactory experience of London with this method of discharging the sewage should make us hesitate about adopting it. While Boston discharges its sewage into the sea without, up to this time, having caused any nuisance, it must be remembered that the tidal variation in Boston Harbor is about ten times as great as that at the head of the Chesapeake Bay. The sewage of Greater New York is discharged into what is practically the ocean; and, while it is not fair to speak of sewage and garbage as representing the same things, it may be of interest to note that, within a week, one of the New York papers felicitously spoke of bathers "dodging garbage in the surf at Coney Island."

The float experiments made by the commission seem to me so inconclusive that I think they ought to be left out of consideration altogether in coming to a decision upon this point.

I have no hesitation in agreeing with the recommendation of the consulting engineers that, despite the greater primary cost of the filtration method, the disposal of the sewage by this method is "the best solution of the problem for all time." Surely the successful experience of the city of Berlin, with its eighteen hundred thousand inhabitants, is an object lesson worthy of consideration.

The Commission has shown that land in abundance and of the most favorable character for the disposal of sewage, can be obtained within eight miles of the city. The cost of this land, as estimated, is only about sixty-five per cent. of that paid by the city of Berlin. With the more scientific construction of sewers now possible, and the exclusion of all storm water, the success of the disposal of the Baltimore sewage by filtration should be much greater than it has proven to be in Berlin, Paris, or any other community where the method has been adopted.

"The city of Berlin never refuses us the necessary money when it is a question of health and of sanitary works," said Mr. Hobrecht, the engineer in charge of the Berlin sewerage, when surprise was expressed at the large expenditure made for this purpose. It is, perhaps, an explanation of the broad-mindedness of the Berlin municipality when we learn that the greatest medical philosopher of the century, Rudolph Virchow, has been for upward of thirty years a member of the Berlin City Council. What might we not hope for here in Baltimore if either Prof. Welch or Prof. Osler were a member of our City Council; but who dare think of such a thing?

The estimates of cost made by the consulting engineers and the commission are of course merely approximative. I am inclined to the opinion, however, that the receipts estimated from the selling of crops from the filtration field in the Baltimore system are fixed at too low a figure. The estimates allow for an income of only three dollars per acre from the sewage fields. In 1887-88 the sewage farms of Berlin were partly managed by the municipality, and partly rented to market gardeners in fields of two or three hectares (five to seven and a-half acres); the rent obtained was on the average two hundred marks (fifty dollars) per hectare.) The portion of the sewage farms managed by the municipality returned an income nearly the same, there being only ten cents per hectare difference in the receipts between the fields managed by the municipality and those rented. It has been found that not only in Berlin, but in Paris, in Dantzic, and in numerous towns in England, the rental value of sewage farms has constantly increased. I have therefore no hesitation in saying that the greater primary cost of the filtration system over the dilution system would be to a considerable extent offset by the increased value of the land used for filtration. But it seems to me that the adoption of the dilution project would be, as it has been in nearly every instance where the conditions were similar to, or approached those in and around Baltimore, an experiment likely to result in failure. The filtration of sewage on the other hand is not an experiment, but has been always, where adopted, a permanent and final solution of the problem. I do not believe that Baltimore can afford to indulge in costly experiments, but the city can afford to expend any reasonable amount to secure the safety, the health and comfort of her citizens.

"WILL IT PAY?"

DR. JOHN S. FULTON.

Attempts to express the economic relations of sanitary works are to most minds not convincing. While we all admit that the State has a pecuniary interest in the life and health of the citizen, it is only when he has been violently bereft of his life or health that we are willing to assess the loss. Except in damage suits, we have no records from which to compute the value of human life, though in the case of domestic animals, clear and satisfactory statements are annually made of the cost of disease and death.

But if no nation has chosen to declare the life of her average citizen to be worth any certain sum, all nations have poured out

money without stint to meet the emergencies of great epidemics. Surely this fact is the best, because indirect and involuntary, evidence that human life and human health are of very great financial importance.

I ask your attention to three illustrations showing the amounts of money which Spain, Italy and the United States have expended on the incidental accompaniments of epidemics of yellow fever and cholera. The examples are taken at random. Eighteen eighty-four was a cholera year in Europe. Early in September, Italy confessed that she had lost in revenue $7,680,000. About two weeks earlier, Spain calculated her loss in customs at $1,000,000, and in imports and exports at $3,240,000. Please observe that these large sums are not the direct cost of cholera, but were items of the contingent expense. Now these governments, if they had invested the whole of these sums in preventive measures would, if successful, have saved the whole value of a large number of lives, plus the public and private cost of the care of the sick and dying, plus extraordinary quarantine, plus all the miserable results that trail after a great epidemic.

In 1878 we had yellow fever in the United States, and it was estimated that we lost, through disturbance of commerce and industry, $100,000,000. Incidentally one may mention the loss of 15,934 lives. If immunity could have been bought and the government had been asked to spend $50,000,000 to immunize all the coast population from the Chesapeake to the Rio Grande, Congress probably would not have listened to the suggestion, and yet, if we had purchased immunity at that price, we would have saved $50,000,000 in commercial and industrial welfare, plus the value of 15,934 lives, plus the public and private cost of a vast amount of sickness and death, plus the greater part of the cost of quarantine.

Now it may occur to some of you that these figures testify to the fear of death in a particular guise rather than to the cost of sickness and death in general; but I think a moment's reflection will show you that what men fear is not the manner of death, but the hour of death; and all this wealth was poured out not against yellow fever, but in the presence of an extraordinary menace of untimely death.

The form of untimely death most common in this latitude is so familiar that we have, I fear, grown indifferent to it.

No epidemic of cholera or yellow fever has ever caused considerable rise in the total mortality of the United States for any year, but there is an annual epidemic of typhoid fever, beside which the epidemics of yellow fever and cholera are a mere bagatelle. A man accustomed to appraisements, Mr. John W. Hill, of Cincinnati, whom Dr. Osler quoted a few minutes since, said last June that the United States pays an annual tax to typhoid

fever of $527,250,000—stupefying figures. This result he obtained by the use of the Illinois court valuation of $5,000 for a human life, and no verdict, I believe, has ever been given by a court in this country for a less sum.

If you have followed me in these three illustrations you must agree that the factors used in the next estimate which I shall show you are as low as they can reasonably be made. On this chart, copied from that of Erwin Smith, of Michigan, you will find the typhoid mortality of 39 well-watered and sewered cities, and of 313 unsewered cities. (Diagram VII.) Now the mortality in the 313 unsewered cities is to the mortality of 39 sewered cities as 4½ is to 1. Taking, for ease of calculation, the population of Baltimore to be 1,000,000, the mortality would be 480 per million, and, applying the ratio 4½ to 1, we find that Baltimore, if sewered, would be entitled to a mortality of only 107 per million. This is not extravagant. Did you not hear Dr. Welch say that such sanitary works had been known to divide the typhoid mortality by twenty? We should save then 373 lives, worth $932,500. It was said many years ago that the value of the average British subject was $720. Chadwick has more recently placed the value of the English laborer at $900. The French private soldier is valued at $1,200. We are said to value our privates at $1,000, though the records of our Pension Bureau indicate that he is, or ought to be, worth more money. No court has awarded for the loss of a life less damages than $5,000, so that $2,500 is well within the bounds of true valuation. It must be remembered that the lives lost from typhoid fever are worth more than the average life, for the incidence of typhoid mortality is upon the best period of life. The greater majority of deaths occur between the ages of 17 and 35. The next item is represented by 373 funerals at $25 each, $9,325. To prevent this number of deaths would mean to prevent about ten times as many attacks of typhoid fever, or about 3,730 cases. The average duration of cases terminating in recovery is 43 days, and if the cost of each day's illness is $1.00, we shall have another item of saving equal to $160,390. In Massachusetts the cost of a day's illness is said to be $2.00. Hence the total annual saving, according to this calculation, would be $1,202,215, which amount you may apply for yourselves to the cost of either of the two projects submitted by the Sewerage Commission.

Here is another estimate and quite a different one: The English experience, which is the longest in the world, shows that their sanitary works have effected a saving equal to 4½ per cent. of the total mortality. Obviously the saving is greater in those parts of the island where the sanitary works exist, and one may, without hesitation, assume that the introduction of sewers will decrease the mortality of Baltimore 3 per cent. at least. In sav-

ing 3 per cent. of the total death rate we should save 360 funerals at $25 each, amounting to $16.500.

If half of the fatalities occurred in effective periods of life we should save, among the 660 persons, 330 who are worth to the city $150 a year, and have each an expectancy of ten years of working life. This item amounts to $495,000.

If there are twelve persons sick for every death, we should, by preventing 660 deaths, prevent twelve times as many illnesses, or 7,920. The cost of one illness may be reckoned at $10. The city pays $3 a week for each free bed in the hospitals, and makes, besides, large appropriations to the dispensaries, so that $10 will not more than cover the cost of an average illness among the dependent classes. We should save in the cost of non-fatal illness not less than $79,200.

It is said that for every death two persons are totally and permanently disabled. If we prevent 660 deaths, then we should prevent also 1,320 wrecks; and supposing these disabled people might have expected but two more effective years of life, we should save, at $150 a year, $396,000. We should also escape the care of that number of derelicts, who could not be cared for at any of our institutions for less than $150 a year, and assuming that they would not die and so get off our hands for two years, our last item is again $396,000. Saving 3 per cent. of our general mortality would at this rate amount to an annual sum of $1,382,700.

These figures, if they are true, and they are true in the sense that they are well within the truth, show that Baltimore can well afford to instal a sewerage system, even at a cost of seventeen million dollars, and that the cost of the dilution project, if we must have the second best system, will be returned to the city within six years.

Be mindful that the figures which I have shown you touch but the skirt of the economic relations of a good sewerage system. Even in the item of better health, we can reasonably expect valuable results to which I have not alluded, and which no man can prophecy. We should have not only better, but more health, and none of us dare say what profits will accrue through increased individual effectiveness; augmented productive energy, individual and corporate; smoother conditions, industrial, commercial and social.

It is worth further remark that the efforts directed against cholera landed the first effective blow upon typhoid mortality, and a resolute assault upon the diseases which are fostered by our filth-laden soil may lead us to good results just as unexpected.

To argue for the saving of life upon the basis of dollars and cents, is to treat this subject upon the lowest plane. We look forward to the day foretold nearly a century since the good old Dr. Rush, when preventable death will be municipal crime.

That time should not be far distant at a period when in respect of two such diseases as cholera and typhoid fevĕr, the whole gospel of salvation for the State and for the individual, the absolute essence of prevention, to-day and forever, can be written large upon a thumb-nail.

DISCUSSION.

Mr. Mendes Cohen: I do not know that I can add anything to what has already been said. We have had a very intelligent and interesting discussion of the subject, and every one is ready, I suppose, to admit that sewerage is necessary. As for the particular plan to be adopted, although a party to the recommendations that have been submitted, I am quite open to conviction if it be demonstrated that a different plan is better suited to the conditions existing at Baltimore.

Any one of the three plans discussed in the Sewerage Report is quite competent to dispose of the sewage satisfactorily. Undoubtedly the best method of disposal is that by filtration on land, and if the city is prepared to meet its greater cost, I believe we might by its adoption have a better system than can be found elsewhere. The system by dilution into the waters of the bay was recommended, because it is believed to be entirely adequate and within our means.

It has been suggested in some of the remarks made here that dilution has been proved to be utterly valueless, because London, which discharged its sewage into the Thames, a short distance below the city, and far from the mouth of the river, had trouble from the carrying back of the sewage by the incoming tide. Now, without remembering exactly what is the rise and fall of tide there, it is very considerable—some twelve or fourteen feet, and I think at spring tides as much as twenty-two feet. The volume of the tidal prism bears so large a proportion to that of the combined fluvial and sewage discharge that the latter is, or rather was, readily driven by and with the flood tide back towards the city.

The system finally adopted at London was to hold the sewage in reservoirs at the outfall points on both sides of the river, respectively twelve and fourteen miles below London bridge, and discharge it only at and after high-water. By this means, the return of the sewage was prevented. The quantity of sewage was however found to be so great in proportion to the fresh water flow of the river, and caused so much defilement, that it became necessary to partly purify the sewage before its discharge. This is now done by the admixture of chemicals, which cause

the precipitation of the more solid particles of the sewage into basins provided to receive the deposit. The partly purified fluid passes into the river, causing much less offense than formerly, and the precipitated filth or "sludge" is transported by steamers at the rate of nearly six thousand tons daily to and beyond the mouth of the river, and is dumped into the North sea.

I do not think the cases at all comparable. The sewage of Baltimore is not to be discharged into the Patapsco river. It is to be carried out into the bay nearly two miles, whence it is expected to be swept into the main channel, and carried down to the ocean. The float observations undertaken by the Commission quite convinced us and our advisors that this expectation is fully warranted, and that there will be no nuisance along the shores of the bay.

If garbage were discharged at the outfall, there might be some flotsam that would occasionally reach the shore. Garbage includes old tomato cans, corn-cobs, &c., &c. The city sewage will contain nothing of this kind originally; besides which it will pass through three screens in its flow from the house connection to the bay, and will thus have the original solids so comminuted as to be quite unobservable.

The water about the point or points of discharge may be somewhat discolored for a short distance, but nothing of a solid or offensive nature will reach the shore.

As to the effect upon the oysters, that is another question, and the commission very carefully considered the problem. At first it was considered best that nothing should be done that could by any possibility affect that interest which we all recognize as of such great importance to the city and State, but, as the report indicates, there are no oysters about the point of proposed discharge—none of commercial importance at any rate. If the taking of oysters there should be prohibited, or if the beds should be acquired by the city itself, that would eliminate the chance of these oysters finding their way to market. Now, when we are told that the pathogenic bacteria may survive until they reach the extreme end of the lower bay, I do not know how to meet such an argument. If they are going to survive such a journey, and one germ is to traverse the extreme length of the bay, and that germ, still maintaining its vitality, strikes an oyster away down in Tangier Sound, and that oyster, instead of disposing of that germ by digesting it and growing fat on it, is to preserve it until it is brought back here, and some one in a susceptible condition for typhoid is to eat it raw and develop a case of typhoid fever—it seems to me that the bringing together of all these chances makes the possibility of infection so remote that we may ignore it.

Now suppose the city, desiring the best, adopts this more expensive filtration system, how about our oysters then? If the typhoid germ maintains itself for so long a time what about a case of typhoid further up the river, at Harrisburg or Havre de Grace? What about the cases that send their germs down the Potomac from Washington and discharge them upon the oysters at the mouth of that river? What about the germs of disease that drop from the vessels passing up and down the bay all the time? It seems to me the risk to the oyster, if any there be, will continue as now, and is not to be increased by the proposed discharge off North Point of the sewage of Baltimore city, for it must be remembered that whilst a large quantity of sewage is now discharged directly into the Patapsco, all the rest is carried to dumping grounds along the shores, whence much of it finds its way to the river and bay.

Dr. Joseph Smith: I would like to ask if there is not sufficient current in the Susquehanna River to drive all the material down without spreading it out over the bay; that was the impression I got from the report.

Mr. Cohen: I can hardly say. In the first place, as to its spreading over the oyster beds, that depends upon where they are. At the proposed point of discharge there are practically no oyster beds. The rise and fall of the tide at the upper part of the bay is only about sixteen or eighteen inches, and at certain stages of the tide there is an upward current. The object in choosing point of discharge was to avoid the influence of the flood tide, carrying the sewage to the eastward, so that it would come into the sweep of the ebb tide from the upper part of the bay. I think the investigation made of the currents pretty clearly developed the probability of such a result.

The meeting then adjourned.

INDEX.

Aberdeen, 46, 77
Abbott, Dr. A. C., Disinfectants, App., 112, 115, 127, 154.
Accounts, 6, 12, 15, 18, 23, 26, 29, 32, 35, 38, 49.
Address of Welcome, Dr William Osler, App. 4.
Address of Acknowledgment, Dr. S. Chase DeKrafft, App. 5.
Allegany County, 6, 15, 16, 28, 33, 34, 36, 38, 47, 48, 60, 67, 69, 88.
Almshouse, Carroll County, 23.
Ambrosia, 152.
Ames, Dr. Delano, App. 49.
American Public Health Association, 47.
Annapolis, 71.
Annapolis Junction, 28, 60, 71.
Anne Arundel County, 7, 28, 34, 37, 48, 60, 67, 71, 92.
Arbutus, 46.
Arlington, 3, 27, 30, 31.
Avalon, 24.

Bacteriological Demonstration of Diphtheria, Dr. W. Royal Stokes, App. 36.
Bacteriological Examination of Water, Dr. W. Royal Stokes, App. 63.
Bacteriological Laboratory, ix.
Baltimore County. 3, 4, 24, 25, 27, 28, 30, 60, 71, 95.
Baltimore Co. Medical Association, 28, 30.
Baltimore City, 50.
B. & O. R. R., 24, 31.
Baltzell, Dr. W. H., 21, 25, 63, 76.
Bel Alton, 48.
Beer, 20, 151.
Billingslea, Dr. J. H., 3, 8, 23, 30, 61, 74, App. 25, 75.
Bishop, Dr. E. Tracy, App. 27.
Blake, Dr. John D., App. 44.
Blindness in Infants, 9, 10, 13, 22, 24, 25.
Bond, Dr. A. K., App., 24, 32. 72.
Brace, Dr. Chas. H., 69.
Bratton, Dr. Howard, 30, 61, 76, App. 97, 103.
Brauns, Mr. Henry, 8, 14, 18.
Brooks, Prof. W. K., Paper, App. 212.
Brooklyn, 7, 34, 37, 92, 93, 94.
Bullock, Dr. Jas. O., 6, 13, 28, 47, 69.

Calvert County, 32, 61, 74.
Cambridge, 11, 19, 27, 30, 31, 120.
Canton, 107, 108, 109.
Caroline County, 37, 61, 74.
Carroll County, 3, 7, 14, 16, 20, 23, 48, 61, 74, 109.

Carrollton, 114.
Castle Run, 45.
Catonsville, 14, 60, 73.
Cecil County, 2, 20, 30, 34, 61, 76, 118, 119, App. 97, 102, 118.
Cerebro Spinal Meningitis, Clement, 144.
Cesspits, 13, 24, 25, 28, 30, 31, 72, 73.
Chaney, Dr. T. M., 32, 61, 74.
Charles County, 4, 48, 61, 75.
Chase, 46, 98, 99, 100.
Chestertown, 131.
Chesterwood, 96.
Clabaugh, Hon. Harry M., letters, 15.
Clabaugh, Hon. Harry M., App. 34.
Claremont, 4.
Clement, Some Diseases of Domestic Animals in Maryland, App. 140.
Clinical and Bacteriological Diagnosis of Diphtheria, Dr. W. H. Welch, App. 39.
Cockeysville, 3.
Cohen, Mr. Mendes, App. 222.
Councell, Dr. Thos. A., 5, 21, 26, 35, 65. 81, App. 26, 73.
Crisfield, 19, 140.
Cumberland, 15, 33, 34, 36, 38, 48, 69, 88.
Curtis Bay, 28.

Davidsonville, 48.
Delmar, 32.
Demonstration of the Chemical Examination of Water, Penniman, App. 66.
Desks, adjustable, Dr. Hiram Woods, Jr., App. 176.
Diagram; showing the relation of diphtheria to vacation periods, App. 76.
Diagram; the autumnal contribution of schools to diphtheria, App. 78.
Diagram; diphtheria as it was and as it might have been (from Michigan experience,) App. 79.
Diagram; relation of typhoid fever mortality to sewerage and water supply (after Smith's chart,) App. 207.
Diagram; typhoid mortality in Munich, App. 208.
Diagram; typhoid fever in sewered houses and in unsewered houses, App. 208.
Diagram; typhoid fever and sewers, (Stockholm), App. 208.
Diagram; relation of typhoid fever to sewerage and water supplies, App. 209.
Diphtheria. 5, 6, 7, 9, 33, 34, 35, 36, 37, 46, 47, 48, App. 36, 39, 44, 49, 75.
Disguises of typhoid fever, Dr. W. Osler, App. 80.
Dorchester County, 11, 19, 27, 20, 31, 43, 48, 61, 76, 120.
Dundalk, 30.
Duval, Dr. Wirt A., App. 30.

Easton, 26, 37, 140.
Elkridge, 24, 121.
Elkton, 2, 30, 118, 119, App. 97, 102.

Ellicott City, 28, 29, 122. 123, 124.
Ellis, Dr. Chas. M. 30, App. 194.
Emergency Fund, xi, 11, 14, 22.
Emmittsburg, 21, 25.
Emory Grove, 95.
Everhart, Dr. Geo. H., 4, 32, 152.

Fendler, Mrs., App. 153, 182.
Finksburg, 114.
Fishing Creek, 48.
Fochtman, Dr. F. W., 69.
Forest Glenn, 8, 14, 17, 37, 136.
Fort, Dr. S. J., App. 164, 193.
Frederick, 62, 76, 121.
Frederick County, 21, 25, 63, 76.
Frizzelburg, 110.
Frostburg, 16.
Fulton, Dr. John S., monthly reports, 4, 6, 12, 15, 19, 23, 26, 29, 32, 35, 38.
Fulton, Dr. John S., App. 7, 25, 31, 59, 71, 73, 75, 91, 106, 114, 218.
Funeral Laws, ix.
Funeral Laws for Rural Districts, Dr. Jos. R. Huntt, App. 19.

Garrett County, 22, 35, 63, 76.
Garrett Park, 35
Gas, asphyxiation, Dr. John Morris, 154.
George's Creek, 7, 40, 44, 45, 89.
Gibbons, Dr. W. H., 64, 79.
Gilchrist, Dr. T. C., App. 189.
Gilman, Dr. Danl. C., App. 59, 75.
Glyndon, 5, 36.
Govanstown, 13, 96.
Grape Juice, 149.
Great Mills, 34.
Gunpowder water shed, 4, 22, 32, 37, 152.
Gwynn's Falls, 4, 6, 19.

Hagerstown, 3, 7, 14, 144.
Hampsted, 111.
Hardesty, Dr. R. F., 2.
Har Sinai Cemetery, 34, 97.
Harford County, 46, 63, 77.
Hartshorne, Dr. Chas. R., App. 27, 115, 152, 188.
Health Conference, 14, 17, 19, 22.
Highlandtown, 9, 13, 17, 37, 61, 74, 100, 101, 102, 103, 104, 105, 106, 107.
Hog pens and Slaughterhouses in Town, Dr. Maynard, App. 147.
Hollingsworth, Dr. C. A., 46, 63, 77.
Howard County, 4, 25, 28, 33, 35, 36, 37, 63, 77, 121, App. 69.
Huntt, Dr. Jos. R., 13, 46, 64, 79, App. 19.

Ice Cream Poisoning, 24, 27.
Illchester, 98.
Illuminating Gas, Dr. John Morris, 154.
Influence of Crude Sewage upon Animal Life in the Bay, Prof. W. K. Brooks, App. 212.

Jails, 19, 23.
Jamar, Dr. John H., 2, 20, 30.
Janney, Dr. Edward, 36, 61, 74, App. 111.
Johnson, Dr. L. B., 64, 80.
Jones, Dr. Geo. P., 61, 76.

Kennedy, Dr. J. H., 77.
Kensington, 64, 79.
Kent County, 24, 27, 37, 63, 78, 130.
de Krafft, Dr. S. Chase, 24, 27, 30,.31, App. 5.
de Krafft, Dr. S. Chase, letter to the Governor, v.

Laurel, 13, 46, 64, 79.
Lee, Dr. Wm., App. 102.
Lewis, Dr. Wm. L., 35, 64, 79, App. 128.
Lisbon, 25, 36.
Live Stock Sanitary Board, 6, 16, 35, 37.
Livengood, Dr. Louis E., App. 60.
Local Boards of Health, vii, Reports, 69 to 86.
Lonaconing, 6, 13, 28, 47, 69, 90.
Lowndes, Hon. Lloyd, 11, 14, 22, 36, 37, App. 3, 5, 6.
Lutherville, 98.

Mace, Dr. John, 31.
Maddox, Dr. J. C., 8, 78.
Malone, Dr. Fred. R., 37, 61, 74.
Manchester, 48, 111.
Marlboro, 3.
Maryland Public Health Association, 17, 22, 48 and Appendix.
Mattfeldt, Dr. Chas L., 14, 24, 46, 60, App. 16, 17, 34, 73.
Mathias, Dr. John S., 75.
Maynard, Dr. S. S., 62, 76, App. 147.
Medical and Chirurgical Faculty, 7, 8, 14, 17, 36.
Medical Inspection of Schools for the Prevention of Diphtheria, Dr. Delano Ames, App. 49.
Methods of Disposal of Sewage, Dr. Geo. H. Rohe, App. 216.
Midwives, registration of, x.
Miller, Mrs. Daniel, App. 167.
Mitten, Chas. N., Summary of Inspections, 154.
Mittnick, Dr. J. H,, App. 126, 156.
Montgomery County, 8, 14, 17, 35, 37, 64, 78, 136.
Monthly Accounts, 6, 12, 15, 18, 23, 26, 29, 32, 35, 38, 49.
Morris, Dr. John, 154, 161, App. 102.

Morris, Mr. John T., App. 184.
McCormick, Dr. J. H., App. 66, 82.
McShane, Dr. James F., 14, 20, 22, 24. 26, 27, 28, 29, 30, 33, 37, 46, 47, App. 91, 195.
Mt. Winans, 48.

National Conference, 1, 32.
National Milling and Mining Co., 17, 20.
New Windsor, 16, 21, 110.
Nichols, Mr. M. B., App. 185, 192, 194.

Observations upon the Sources and Spread of Typhoid Fever, Dr. T. B. Owings, App. 69.
Observations on the Hygene of the Public Schools of Howard Co., Dr. S. J Fort, App. 164.
Ocean City, 28, 36, 146.
Oella, 28.
Osler, Dr Wm., App. 4, 80, 209.
Owens, Mr. B. B., App. 193.
Owings, Dr. Thomas B., 25, 28, 29, 35, 63, 77, App. 69, 187.
Oxford, 35.
Oysters, Prof. W. K. Brooks, App. 212

Penwood Park, 97.
Penniman, Prof. W. B. D., 17, 19, 27, 87, App. 66, 73, 74, 126, 128.
Personal and Domestic Prophylaxis, Dr. J. D. Blake, App. 44.
Perryman, 46.
Pollution of water supply, vii.
Pollution of soil and water, Dr. John S. Fulton, App. 106.
Poplar Springs, 35.
Port Deposit, 20, 21, 34.
Potomac, 39, 43, 89, 90, 91.
Posey, Dr. C. H., 48, 61, 75.
Powellsville, 9.
Preston, 37.
Prettyman, Prof. E. B., App. 182.
Prince George's County, 3, 13, 46, 64, 79, 140.
Public Schools, sanitary condition, Dr. W. D. Thomas, App. 157.
Public schools, sanitary condition, Dr. S. J. Fort, App. 165.
Public schools, sanitary condition, Mrs. Mary K. Miller, App. 167.
Public schools, effect upon eye sight, Dr. Hiram Woods, App. 170.
Public schools, water supply, 96, 97, 109 to 118, 122 to 130, 140 to 143.
Puerperal Infection, x.
Pulp and paper Works, Piedmont, 33, 34, 39.
Purnell, Dr. J. B. R., 65, 85, App. 188.

Queponco, 34.
Queen Anne Co, 64, 80.

Rabies, Dr. A. W. Clement, App. 143.
Rabies, Dr. John Morris, 161.
Reading R. R., 26, 21, 34.
Reistertown, 47, 98.
Relay, 24, 31.
Relation of Sewage, Disposal to Public Health, Dr. W. H. Welch, App. 202.
Relation of Typhoid Mortality and Sewerage, Dr. Wm. Osler, App. 210.
Report upon Typhoid Fever, from a recent experience in Balto. Co., Dr. P. F. Sappington, App. 103.
Report upon Inspection of the Public Schools of Baltimore, Mrs. Daniel Miller, App. 167.
Report of the Sewerage Commission, Dr. James F. McShane, App. 195.
Rogers, Mr. Chas. B., App. 23, 111, 113, 182, 185, 194.
Rohe, Dr. Geo. H., App. 21, 32, 216.
Ruhrah, Dr. John, App. 155.

Salisbury, 13, 16, 144.
Sanitary survey of towns and villages for the prevention of typhoid fever, Dr. J. H. McCormick, App. 82.
Sanitary Ordinances, Post-mortem, Dr. Howard Brattan, App. 97.
Sappington, Dr. P. F., 25, 27, 30, 31, 33, 36, 46, 47, 48, 60, 71.
Schaeffer, Dr. E. M., App. 3, 27, 34, 59, 186.
Scarlet Fever, 27, 28, 31, 34, 46, 80.
School Life and Children's Eye sight, Dr. Hiram Woods, Jr., App. 170.
Scott, Dr. J. McP., 65, 81, App. 29, 33, 72.
Secretary's Reports, 1 to 49.
Sewage, effect upon animal life in the bay, Prof. W. K. Brooks, App. 212.
Sewage, method of disposal, Dr. Geo. H. Rohe, App. 216.
Sewerage Commission, Dr. Jas. F. McShane, App, 195.
Sewerage and public health, Dr. W. H. Welch, App. 202.
Sewerage and typhoid mortality, Dr. Wm. Osler, App. 210.
Sewerage. Will it pay? Dr. Fulton, App. 218.
Sextonville, 4, 6.
Should physicians be paid for the returns of births, deaths and diseases? Dr. Geo H. Rohe, App. 21; Simmons, Dr. T. W., 3, 7, 14.
Slaughterhouses, 4, 6, 7, 19, 20, 21, 25, 33, 36, 45, App. 128, 150.
Smart, Dr. L. G., App. 154.
Smith, Dr. Jos., App. 224.
Snow Hill, 48.
Solomon's Island, 32.
Somerset County, 37, 65, 80, 140.
Stabler, Dr. August, App. 25, 34, 66, 71, 75, 113, 127, 151.
Steuart, Dr. Geo. C., 3, App. 30.
Steuart, Dr. Jas. A., quarterly report, 1.
Still Pond, 37.
Stiles, Dr. C. Wardell, Some of the Dangers Arising from Slaughterhouses, with suggestions for Meeting them, App. 128.

Stokes, Dr. W. Royal, 6. 15, 46, 95, 99, 135, 139, 145, 146, App. 63, 71, 75, 120, 127, 145.
St. Denis, 24.
St. Mary's County, 34, 64, 80.
St. Michael's, 5, 141.

Talbot County, 5, 21, 25, 26, 35, 37, 65, 81, 140.
Taneyhill, Dr. G. Lane, App. 189.
Taneytown, 110.
Thomas, Dr. W. Dulany, App. 140.
Thompson, Dr. Frank H., 60, 71, App. 23, 73.
Todd, Dr. Wm. J., App. 27, 33, 72.
Towson, 33, 37.
Transportation of dead bodies, 33.
Truitt, Dr. Chas. R., 32, 34, 65, 83.
Tuberculosis, Dr. Clement, 140.
Typhoid fever, xi, 2, 5, 7, 11, 12, 32, 34, 35, 37, 46, 48.
Typhoid fever inquiry, 5, 66.

Union Bridge, 109.
Uniontown, 113.
Urie, Dr. Jas. W., 24, 27, 37, 63, 78.

Vaccination, viii, 26, App. 28, 187.
Vidal test, 46.
Vinegar, 147.
Vital statistics of Baltimore, 50.
Vital statisiics of the Counties, 57.
Vital statistics, paper by Dr. John S. Fulton, App. 7.
Vital statistics, paper by Dr. C. L. Mattfeldt, App, 17.
Vital statistics, viii, 2, 50, App. 7, 17, 21, 92, 96.

Washington county, 3, 7, 14, 65, 81, 143.
Water analyses, 87 to 146.
Weimer, Mr. H. G., App, 24.
Welch, Dr. W. H., App. 39, 74, 95, 113, 154, 156, 181, 184, 193, 202.
Westminster, 7, 20, 23, 111, 112, 113, 118.
Westport, 48.
Whitehaven, 17.
Wicomico county, 9, 16, 17, 34, 65, 83, 144.
Will it pay? By Doctor John S. Fulton, App. 218.
Will's Creek, 40, 44, 88.
Woods, Dr. Hiram, Jr., App 170, 193.
Worcester county, 16, 28, 34, 36, 48, 65, 85, 146.
Worthington, Dr. J. M., 7, 28, 34, 37, 48, 60, 71.
Wysham, Dr. W. E., 14.

Yellow fever, 37.
York road, 13.